British Columbia's Fish Product and Seafood Industry in the 1990s

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1. Introduction

This report, which was prepared by BC STATS for the Ministry of Agriculture, Food and Fisheries, provides a statistical overview of the trends and performance of British Columbia's fish product and seafood industry during the 1990s.

Three components of the BC fish product and seafood industry are examined:

- the commercial fishery;
- aquaculture; and
- fish processing.

As well, the report looks at trends in:

- developing markets, particularly exports;
- added-value processing; and
- employment

This report does not cover the activities of the recreational fishery, which is the fourth pillar of the fisheries and aquaculture sector. Summary information, covering all four components of the sector, can be found in the 2001 edition of BC STATS' report on the fisheries and aquaculture sector, due to be released shortly.

Data Sources

As the report focuses on the 1990s, references to statistical data and charts showing trends in the fish product and seafood industry are limited to those years. All data reported in this document are current to February 2001. Changes to data series such as exports that were released after the end of February have not been incorporated into the document.

Statistics on fish landings, landed values and the wholesale value of the BC fishery were compiled by BC STATS based on information from BC Fisheries. The data are preliminary for 1997 and 1998, and estimates for 1999.

Clam aquaculture production and farmgate values are from Statistics Canada livestock statistics.

Licence statistics for the commercial fishery were obtained from DFO (Department of Fisheries and Oceans) Ottawa Statistical Services, with updates from DFO Pacific documents for more recent years.

BC fish processing plant and employment information, including regional data, was provided by BC Fisheries. Data for 1999 are preliminary estimates.

Data on the value of shipments for the fish processing industry is from Statistics Canada's survey of manufacturers.

Annual employment estimates for the commercial fishery, aquaculture and fish processing industry are based on information from the Statistics Canada labour force survey.

Finally, BC fish export statistics (both value and volume) were compiled from detailed information provided by Statistics Canada to BC STATS.

Added-Value Processing

The term added-value processing is used instead of "value added" in this report, as the latter has a specific meaning in economics which could cause confusion. These estimates were obtained from BC Fisheries.

Price Data

The landed and wholesale price series were calculated using data on the volume, landed value and wholesale value of the catch. Therefore, they represent average prices. Similarly, export prices were calculated from value and volume data.

2. Executive summary

The Commercial Fishery

- The 1990s were a challenging time for the province's commercial fishery as some salmon stocks fell to dangerously low levels. Resource management initiatives introduced to preserve these stocks resulted in salmon fishing activity in BC's coastal waters being severely curtailed.
- Various management initiatives were put in place to protect the stock of finfish and shellfish species in BC waters during the 1990s. These included area licencing, single gear licencing, a voluntary licence retirement program to reduce the harvesting capacity of the fleet, an individual vessel quota (IVQ) system, tight controls on transfers of quotas, by-catch caps and various other measures aimed at protecting the stock.
- In terms of income to fishers, salmon, halibut and herring have traditionally been the most important species landed in the province, but a variety of other finfish and shellfish species are harvested in the province.
- Overall, the landed value of wild fish and seafood products commercially harvested[1] in BC decreased by a third during the 1990s, falling from $476 million in 1990 to $311 million in 1999. The wholesale value decreased from $943 million to $656 million during the same period.

Wild Salmon

- Limitations on the stock of wild salmon available for harvest were the main reason for the drop in landed value. In 1990, more than half ($263 million) of the landed value of the catch was wild salmon. By the end of the decade, wild salmon accounted for just $25 million of total landed value. The wholesale value of the wild salmon catch fell to $169 million in 1999, down from $564 million nine years earlier. The volume landed dropped from 96.4 thousand tonnes to 16.9 thousand tonnes during this period.

Herring

- Herring landings (including roe, spawn on kelp, and food and bait herring) fluctuated during the 1990s, but the general trend was down. In 1990, the landed value of the catch was $81 million. It had fallen to $52 million by the end of the decade. Roe herring accounted for nearly all ($50 million) of the landed value of the catch in 1999.
- The wholesale value of the herring catch dropped from $169 million in 1990 to $119 million in 1999, while the volume of the catch fell from 41.3 thousand tonnes to 29.8 thousand tonnes.

[1] This excludes farmed salmon, cultivated oysters, clams, and other farmed finfish and shellfish products

Halibut

- The landed value of halibut caught by the BC fleet was $39 million in 1999, compared to $21 million in 1990. Wholesale values doubled, rising from $28 million to $59 million during the same period. While most of the halibut catch is landed in BC, some is delivered directly to US ports.
- Halibut is a higher-valued species, and the volume of the halibut catch was relatively low compared to other groundfish species, at 5.5 thousand tonnes in 1999. The volume of the halibut catch had been 3.8 thousand tonnes in 1990.

Other Groundfish Species

- The landed value of other groundfish species harvested by the BC fleet increased substantially, going from $67 million in 1990 to $100 million at the end of the decade. Wholesale values increased from $116 million to $164 million during the same period. The volume of the catch was unchanged at 139 thousand tonnes.
- Rockfish ($37 million), sablefish ($27 million) and hake ($18 million) comprised a substantial share of the landed value of BC-caught groundfish in 1999. In terms of wholesale value, these species were worth $125 million in that year. Wholesale values were $50 million for rockfish, $46 million for hake, and $29 million for sablefish in 1999.
- By volume, the composition of groundfish landings was quite different. The hake catch (92.5 thousand tonnes in 1999) was by far the biggest, followed by rockfish (23.9 thousand tonnes) and sole (5.6 thousand tonnes).
- The hake catch grew from 79.4 thousand tonnes in 1990 to 92.5 thousand tonnes in 1999. The catch of most other groundfish species (except turbot) was flat or declined during this period.

Wild and Cultivated Shellfish

- BC's shellfish harvest expanded during the 1990s. The landed value of both wild and cultivated shellfish species more than doubled, increasing from $46 million in 1990 to $104 million in 1999. This included $10 million of cultivated shellfish (oysters, clams, and other species), up from [illegible] million in 1990.
- The wholesale value of wild and cultivated shellfish was $159 million in 1999, up from $69 million at the beginning of the decade. Geoducks ($56 million), shrimp and prawns ($29 million), crabs ($25 million) and sea urchins ($19.5 million) accounted for the biggest shares of total wholesale value. The wholesale value of geoduck clams more than tripled between 1990 and 1999, going from $16 million to $56 million.

Finfish and Shellfish Aquaculture

- British Columbia's aquaculture industry is the biggest in the country and saw phenomenal growth during the 1990s, with a threefold

increase in the value of production. Total aquaculture production was $303 million (farmgate value) in 1999, up from $83 million at the beginning of the decade. Finfish (primarily salmon) farming dominates the industry.

Farmed Salmon

- The farmgate value of salmon produced in BC went from $79 million in 1990 to $292 million in 1999. In terms of wholesale value, farmed salmon production grew from $85 million to $329 million during this period. In 1999, the farmed salmon harvest was 49.1 thousand tonnes, up from 15.5 thousand tonnes at the beginning of the decade.

Shellfish Aquaculture

- Pacific oysters and manila clams are the main species produced by BC shellfish farms. In addition there is small-scale cultivation of scallops and mussels. Other shellfish such as sea cucumber, sea urchin, geoduck clam and abalone are being cultured in experimental quantities.
- The farmed shellfish industry is small compared to the farmed salmon industry, but has seen similarly strong growth. Between 1990 and 1999, the farmgate value of cultivated shellfish products increased from $4 million to $10 million. Wholesale values grew from $5 million to $18 million during this period.
- Based on wholesale value, the most important farmed shellfish products were oysters (with a wholesale value of $11 million in 1999) and clams ($7 million).

Fish Processing

- The fortunes of the province's fish processing industry have always been closely linked to the wild salmon fishery, as canned salmon has traditionally been one of the most important products. The value of fish products shipped by processors has fallen sharply since 1995, when they peaked at $863 million. Statistics Canada reports that the value of shipments by fish processing establishments in the province was $469 million in 1999.
- In some years, BC fish processing companies can significant quantities of US-caught fish. About 90% of BC's canned salmon pack was of US origin in 1997.
- The number of fish processing plants in the province has declined as industry consolidation has led to plant closures in coastal communities, particularly those on Vancouver Island.

Added-Value Processing

- It is estimated that added-value processing activities generated 56% of the total value of BC fish and seafood products (excluding farmed

salmon) in 1999. This includes a significant amount of activity related to the processing of fish and seafood imported into BC.

Export Markets

- BC's seafood and fish processing industry is highly dependent on export markets, with most of the production destined for the US and overseas. The re-export of products such as salmon and herring imported into BC and then processed in the province is also a significant factor.
- The value of BC's fish and seafood exports rose from $773 million to $854 million between 1990 and 1999, even though the value of wild salmon products–traditionally the most important export–fell from $441 million to $103 million during this period.
- Farmed salmon exports have soared since 1990 (growing from $13[2] million to $256 million), and this, together with higher exports of other products such as halibut, shellfish and various groundfish species, is the main reason for the export growth during the 1990s.
- The US is the province's biggest and fastest-growing market, accounting for nearly two-thirds of the total value of fish exports in 1999. Japan was the biggest purchaser of BC fish and seafood products in the early 1990s, but fell behind the US later in the decade.
- The value of fish and seafood product exports reflects many factors not directly related to the state of the fishery. These include exchange rate fluctuations (particularly relative to the US dollar and the Japanese yen), as well as general economic conditions in important markets for BC products. For example, weak economic conditions in Asian economies during the 1990s led to a drop in the demand for BC seafood products such as roe herring, which are primarily destined for those markets.

Employment

- In 1990, employment in BC's commercial fishing, aquaculture and fish processing industries averaged about 11 thousand people[3]. By 1999, the total had fallen to just under 8 thousand as employment in both commercial fishing and fish processing declined.

[2] It was assumed that all Atlantic salmon exports from BC in 1990 were farmed product.
[3] Based on annual averages from the Labour Force Survey. These figures represent the average number of people employed over the course of the year. At any given point in time, the number of people working in the industry may have been significantly higher, or lower, than these figures due to the highly seasonal nature of this industry.

3. Overview of the Industry

The BC fish product and seafood industry experienced fundamental change and significant challenges during the 1990s. The pivotal shift for the industry during this period was the decline in the commercial salmon fishery and the growing contribution of BC's farmed salmon product.

In addition to changes in the wild salmon fishery, a number of other BC fisheries were experiencing declining stock abundance and other management problems. Over the decade, about one-half of BC's fish and seafood production was sold into international markets dominated by world-wide supply and subject to large swings in demand and price.

Loss of wild salmon revenues

In 1990, wild salmon accounted for 47% of the total landed (including farmgate) value of BC fish products, 55% of the wholesale value, and 68% of export sales. Over the remainder of the decade, there was a 90% reduction in landed value for wild salmon (the amount paid to BC harvesters). The wholesale value of wild salmon products fell by 70%, and the value of wild salmon exports declined by 77%.

Various initiatives contributed to replacing some of the income lost by the BC economy and its fish product and seafood industry due to restrictions on the wild salmon harvest. Changes in fish handling and processing procedures, and shifts in the international marketplace were important factors that helped mitigate some of the effect of the downturn in the wild salmon fishery. Other factors included:

- increases in aquaculture production and value;
- changes to fisheries management;
- the development of a new individual vessel quota (IVQ) regime that allowed the groundfish fishery to become more market driven;
- the development of new fisheries and specialty products;
- improving on-board fish handling and product quality to increase the value of species being harvested;
- added-value processing; and
- a focus on higher priced export markets.

Aquaculture

The 1990s were marked by greatly increased output and value for the BC aquaculture industry, which includes both finfish and shellfish farming. At the beginning of the decade, 94% by volume of BC's fish harvest was wild product. In 1999, that figure stood at 79%. In other words, farmed product grew from 6% of harvest to 21% in just nine years. In terms of landed (including farmgate) values, growth for BC farmed fish products increased even more dramatically, from 15% of sales in 1990 to 49% at the end of the decade.

For BC salmon, farmed product was 14% of landings and 23% of the landed (including farmgate) value of total salmon production in 1990. At the end of the

decade, aquaculture accounted for 75% of salmon production and 92% of sales value.

Shellfish aquaculture production volumes rose 32% during the 1990s. Finfish, almost exclusively farmed salmon[4], dominated BC aquaculture during the decade, increasing from a 77% share of total production in 1990 to 88% at the end of the decade. For shellfish farming, the harvesting of oysters and clams predominated, although there was small-scale farming of mussels and scallops along with experimental farming of other products.

Fisheries management measures

During the 1990s, significant management measures were implemented or continued for the BC commercial fisheries, including fishery closures, reductions in quotas, and reduced numbers of licences for the wild salmon fishery.

For the BC commercial salmon fishery, fishery control measures became more stringent as some stocks fell to dangerously low levels. Management initiatives, started in 1996, included area licencing, single gear licencing and a voluntary licence retirement program to reduce the harvesting capacity of the fleet. By the end of the decade, the number of BC commercial salmon fishing licences issued by DFO had decreased from 4,486 licences in 1990 to 2,860 in 1999.

For the BC halibut fishery, an IVQ system was introduced in 1991 based on a percentage of total allowable catch along with increased user fees to finance enforcement. Limited entry licencing, which had been in effect for the groundfish trawl since 1976, was introduced for the groundfish hook and line rockfishery beginning in 1991 and 1992. An IVQ system was introduced in the groundfish trawl fishery in 1997, including tight controls on transfers of quotas and by-catch caps. For roe herring, a pool fishery management program was introduced in 1998 to control catch by limiting numbers of vessels.

Among commercially landed shellfish, the BC abalone fishery was closed indefinitely in December 1990 due to declining stocks, and the goose barnacle fishery was closed in May 1999. For geoduck clams, an IVQ system was implemented in 1989, along with area selection and rotation, with entry limited to 55 licences. A sea urchin IVQ was also introduced in 1994. The BC shrimp trawl fishery had been open year-round with no catch limitation until 1996. However, following the over-harvesting of stocks in 1995 and 1996, catch limits, stock assessment, and an industry-funded monitoring program were put in place for 1997.

Groundfish, new fisheries and specialty products

Groundfish assumed an increasingly important role in the BC commercial fishery during the decade. In 1990, groundfish accounted for 47% of BC commercial wild fish landings. That figure stood at 66% in 1999. While groundfish landings did not increase over the decade, this highly diverse fishery underwent significant change, and the value of the fishery overall grew considerably with rising prices, particularly for hake and rockfish.

[4] Trout farms accounted for less than 1% of total farmed finfish production during the 1990s.

In quantity terms, landings of hake continued to dominate the BC groundfish fishery. Also, less of this particular product was directly exported, with virtually the total on-shore allocation of the hake harvest being sold to BC fish plants for processing into surimi and other added-value products after 1992. There was a significant increase in the on-shore share of the Total Allowable Catch from about 19 thousand tonnes in 1992 to 69.5 thousand tonnes in 1999. In contrast to wild salmon, the groundfish fishery has provided a year-round ongoing supply of high quality product to BC fish processing plants.

During the 1990s, there was more emphasis on special handling and matching of BC fish to specific markets, as well as a strengthening of wholesale markets connecting production with demand. For example, some rockfish is now sold into the live market. There was also increased emphasis on high-quality, premium products geared to particular markets. An example is the highly successful geoduck clam fishery, which has focused on conservation, sustained yield, and selling specifically processed products to a high-price market internationally.

During the decade, there was a diversification of the BC fishery, expanding the range of species harvested. New experimental commercial fisheries were initiated for tanner crab and sardines, as well as government supported evaluations of other new fisheries such as hagfish, box crab, purple sea urchin, mackerel and pilchards. These developments were largely directed to the harvest and processing of new products for markets in the Far East

In terms of the onboard handling of fish, measures were implemented to ensure freshness and maintain product quality. As well, added-value processing was applied to products formerly exported (or otherwise sold) without further processing. Examples include the specialized processing later in the decade of spiny dogfish to meet specific market requirements in Japan and Europe, and the development of new product lines. Generally, there was improved handling and processing of BC fish products, emphasizing quality and resulting in a higher-valued product.

4. Wild Salmon

The wild salmon fishery includes the harvest of chinook, sockeye, coho, pink and chum salmon.

Landings and exports

BC's wild salmon fishery experienced dramatic reductions in commercial landings during the 1990s as a result of a number of stock specific conservation concerns and subsequent management measures implemented to address these issues. In 1990, the wild salmon catch stood at 96.4 thousand tonnes. At the end of the decade, the total wild harvest was 16.9 thousand tonnes, an overall reduction of 82% in just nine years. The reduction in harvest had a smaller effect on exports compared to domestic sales.

BC's wild salmon catch plummeted during the decade

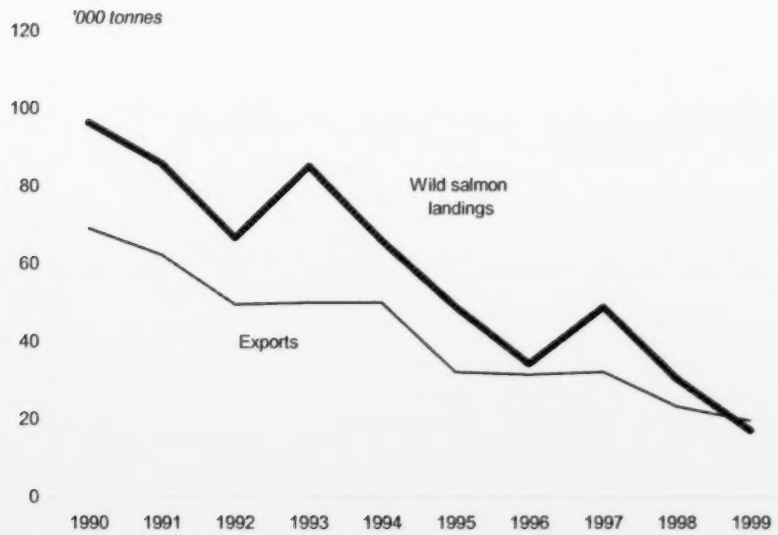

Figure 1

Wild harvest reductions were severe for all salmon species as the mixed stock/species nature of salmon fisheries resulted in commercial fisheries foregoing the harvest of more abundant species in order to protect specific stocks and species. Reductions in landings by species were as follows: pink 63%; chum 71%; chinook 87%; sockeye 95%; and coho virtually 100%. Severe restrictions on the commercial harvest of coho began in 1996, and became progressively more restrictive over the remainder of the decade, until there were virtually no commercial landings of coho in 1998 and 1999.

Landings for sockeye fluctuated most as the harvest for all salmon generally declined

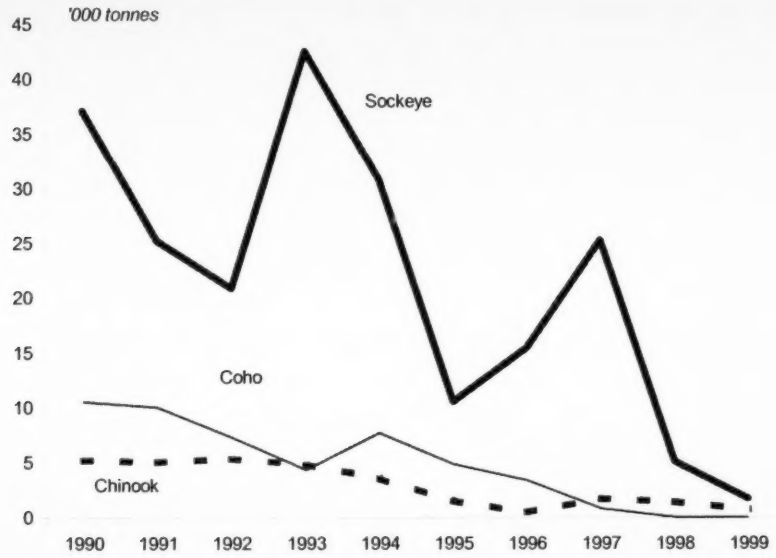

Figure 2

Landings for pinks and chum salmon also decreased

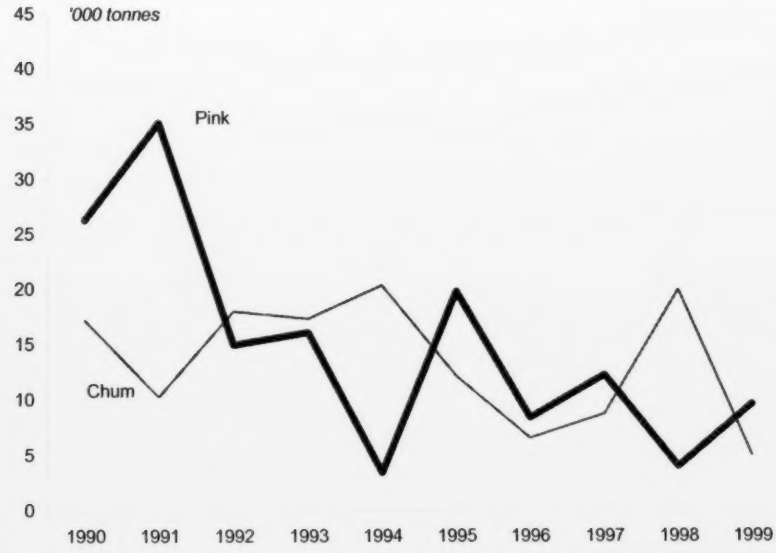

Figure 3

Value of the BC wild salmon fishery

Wild salmon harvest reductions severely affected salmon harvesters and the economic activity dependent on the fishery during the 1990s. In 1990, the value of BC commercial fishery landings for salmon was $263 million. By the end of the decade, harvesters were paid just $25 million, a 90% reduction in revenues over ten years. However, a brief resurgence in revenues was seen in 1994 and again in 1997, due largely to upturns in landings for BC sockeye and a strengthening of prices in those years.

The landed value of wild salmon also fell

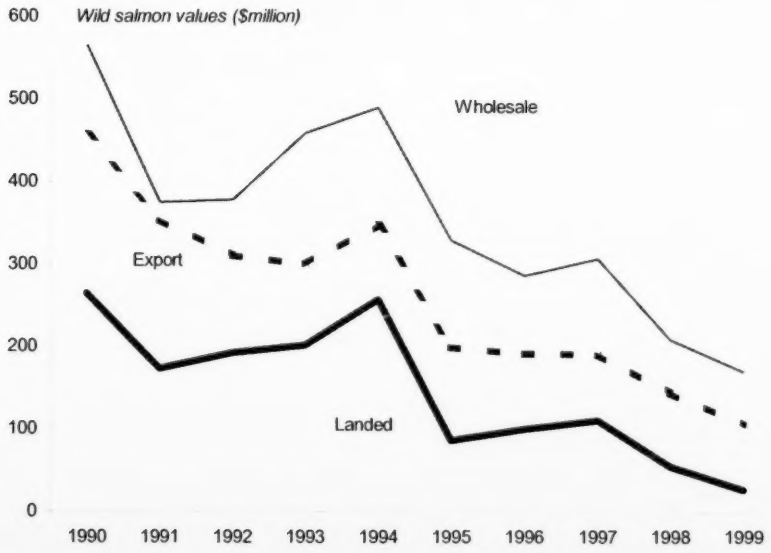

Figure 4

Wholesale and export values for BC wild salmon and wild salmon products also fell dramatically over the decade, by 70% and 77% respectively.

Later in the decade, wholesale values for wild salmon were kept at a somewhat higher level due to the processing of mainly US (Alaskan), and to a lesser extent Russian-caught, fish at BC plants. For example, in 1999, imports of US and Russian salmon were 73% of BC's canned salmon pack. As a result, the ratio that year for wholesale value to landed value for wild salmon stood at 6.6. Between 1995 and 1998, the ratio was in the range of 2.8 to 3.8, while prior to 1995, it fluctuated around 2.

Swings in sockeye landed values dominated payments to harvesters for BC wild salmon

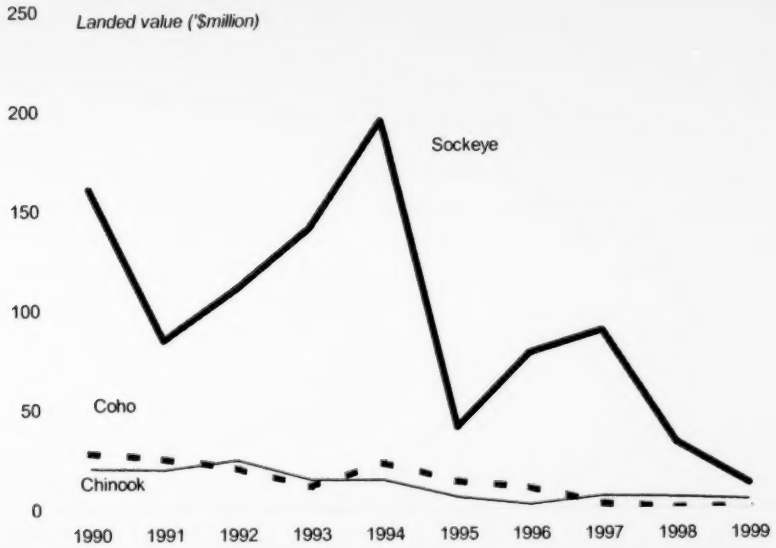

Figure 5

Landed values for pink and chum salmon decreased

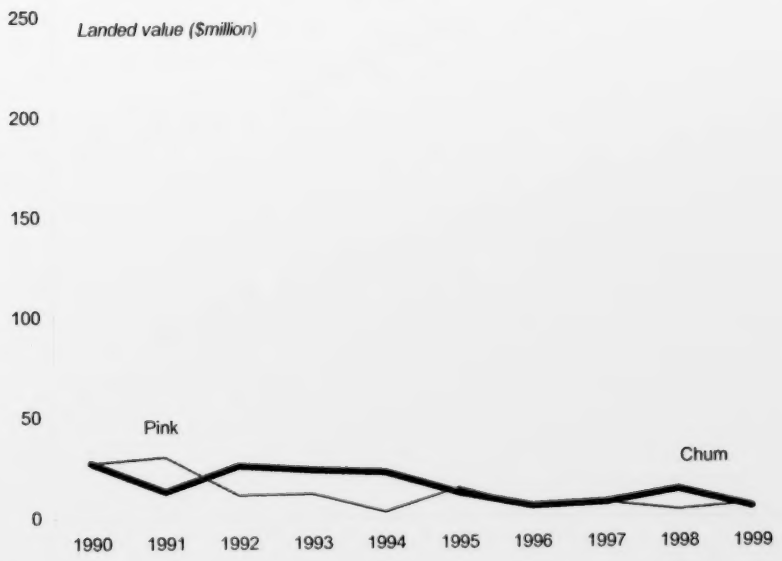

Figure 6

Price levels for BC wild salmon

In 1990, the average price paid for commercially landed salmon was $2.73 per kg. At the end of the decade, the average price level was just $1.50 per kg, a 45% reduction. The main reason for the decline in the average price was management action taken to address conservation concerns, which severely affected landings of sockeye, chinook and coho salmon. These species are more highly valued than pink and chum salmon. Export price levels followed a similar pattern. The rise in wholesale prices reflects both the processing of imported salmon and the value-added nature of this processing.

Landed prices declined while wholesale prices rose, as less valuable salmon was harvested but more highly processed. Wholesale prices also reflect the value of salmon imported for processing in BC

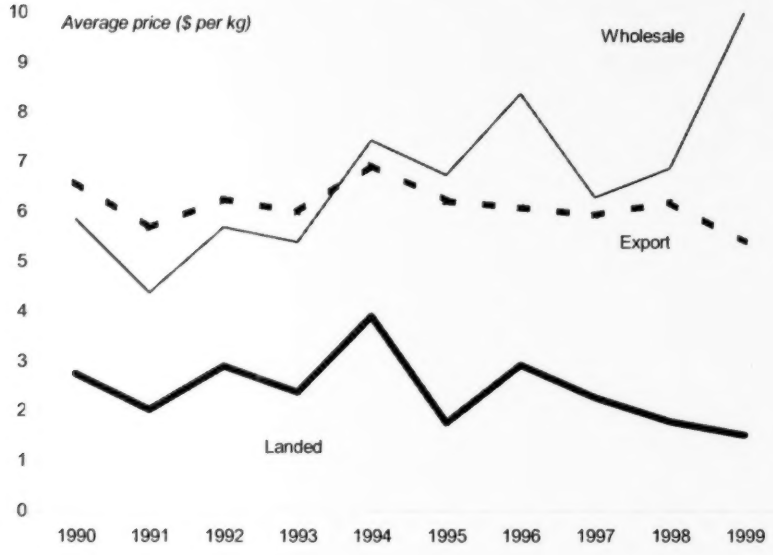

Figure 7

The overall price drop for salmon masks quite different changes in price and landings levels for the various salmon species. In particular, prices rose significantly during the 1990s for chinook (39%) and sockeye salmon (62%), species whose reductions in landings were particularly dramatic. By comparison, prices fell over the decade for pink (-43%) and chum salmon (-47%).

While production dropped for all salmon during the decade, lower valued species with falling prices took an increasing share of harvest from the more sought-after and higher-priced salmon. To illustrate, in 1990, sockeye, chinook and coho salmon represented a combined 55% of BC salmon landings by weight. Chum and pink salmon were 45% of landings by weight. At the end of the decade, sockeye, chinook and coho salmon had just a 14% share while chum and pink salmon landings represented 86% of the wild harvest.

Landed prices for sockeye and coho salmon increased sharply at the end of the decade...

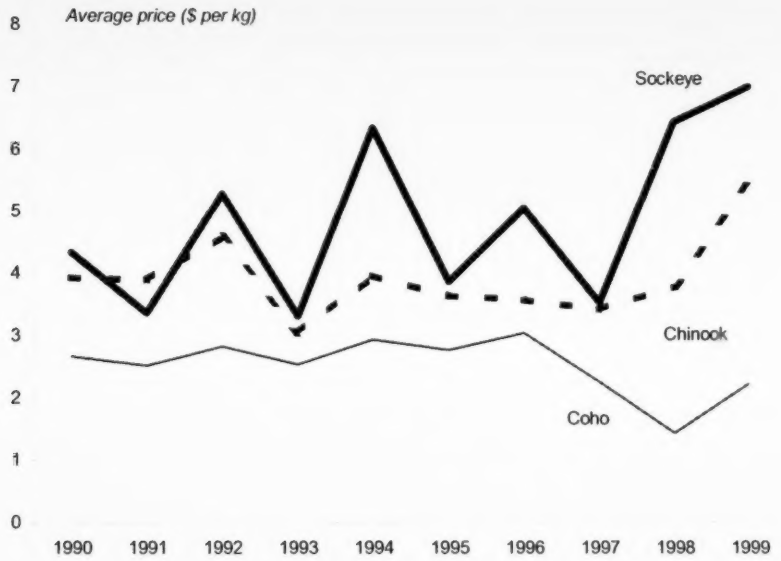

Figure 8

...while prices for lower-valued chum and pink salmon generally declined during the 1990s

Figure 9

5. Herring

The BC herring fishery comprises the harvest of roe herring (including spawn on kelp) and herring for food and bait. The roe herring fishery dominates, accounting for 98% of landings by volume during the 1990s. Historically, commercial landings of herring have fluctuated considerably.

Landings and exports

During the first half of the 1990s, BC herring landings were reasonably constant at about 40 thousand tonnes. However, in 1995 the commercial harvest of herring fell dramatically. After reaching a low of 22.6 thousand tonnes in 1996, landing levels recovered somewhat and stood at 29.8 thousand tonnes at the end of the decade. The downturn in the mid-1990s was partly due to the effects of successive El Nino events starting in 1993. In addition, landings of roe herring were reduced as market demand fell.

Herring landings plunged mid-decade, recovering somewhat after 1996, while export levels remained fairly constant

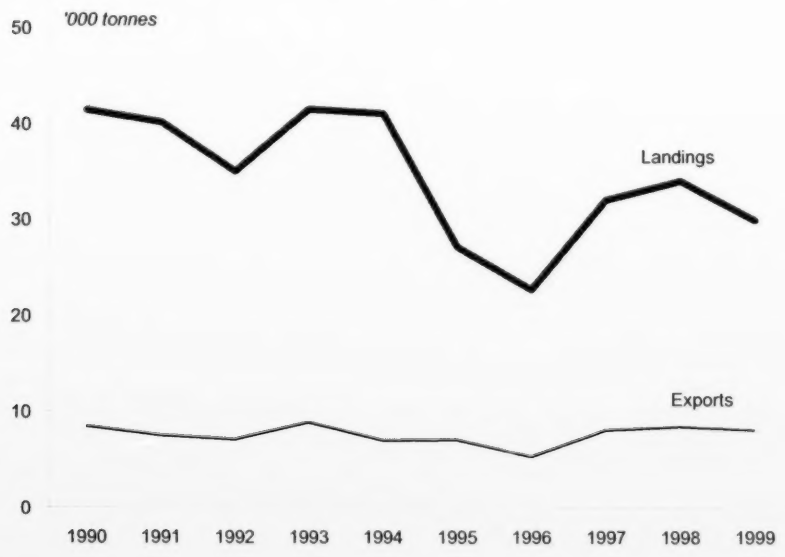

Figure 10

The roe herring harvest fell 28% during the 1990s, decreasing from 40.3 thousand tonnes in 1990 to 29.2 thousand tonnes in 1999. Over the same period, the volume of food and bait herring caught each year fluctuated, ranging between 300 and 1,100 tonnes, but remained relatively insubstantial in comparison with the roe harvest.

Almost all of the harvest in the herring fishery is roe herring (including spawn on kelp)

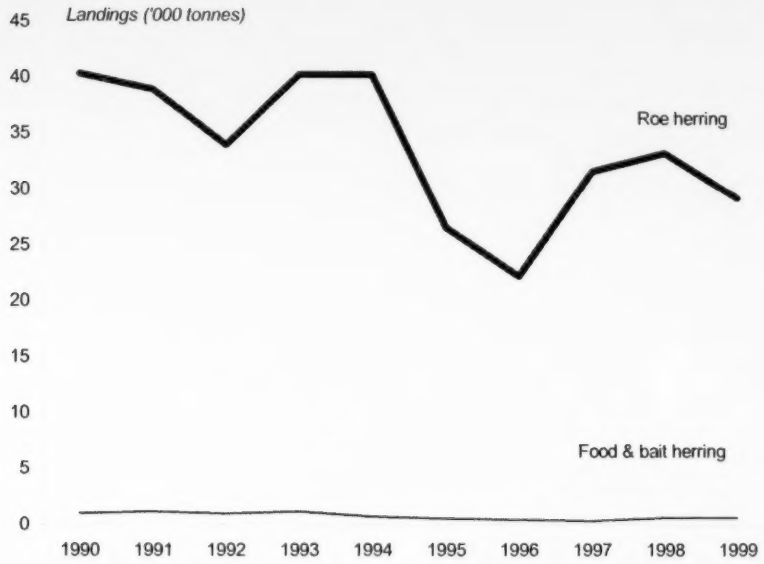

Figure 11

Total export volumes of BC herring were reasonably constant over the period, in the order of 7 to 8 thousand tonnes. In 1990, 81% of BC herring exports (by volume) were shipped to Japan. Nine years later, Japan's share of BC herring export volumes had fallen to 53%.

Reduced export volumes to Japan were replaced by increased sales of BC herring to the US, the destination for 38% of export volume in 1999; and to China[5] which had an 8% share at the end of the decade. BC herring exports to Japan and China were almost exclusively roe herring. Roe herring accounted for just over half (57%) of BC's total herring exports in 1999, with nearly all of it going to Japan (88%) and China (9%). The roe exports were not all from the domestic catch. In some years, BC companies imported round herring, which was then "popped" to harvest roe.

Herring exports to the US rose substantially at the end of the decade. This was a result of free trade, which allowed for more herring to be exported to the United States, with a commitment that it would be either consumed or "popped" in that country, and not just bulk exported to Asia for popping.

Almost all BC herring products (by volume) destined for the US market are round herring rather than roe. These products represented 18% of BC's total herring exports by volume in 1990. That figure stood at 43% of the total volume of exports in 1999, with most (85%) of it going to the US.

[5] China includes Mainland China, as well as Hong Kong and Macao

Roe exports fell while the volume of other herring products rose during the 1990s

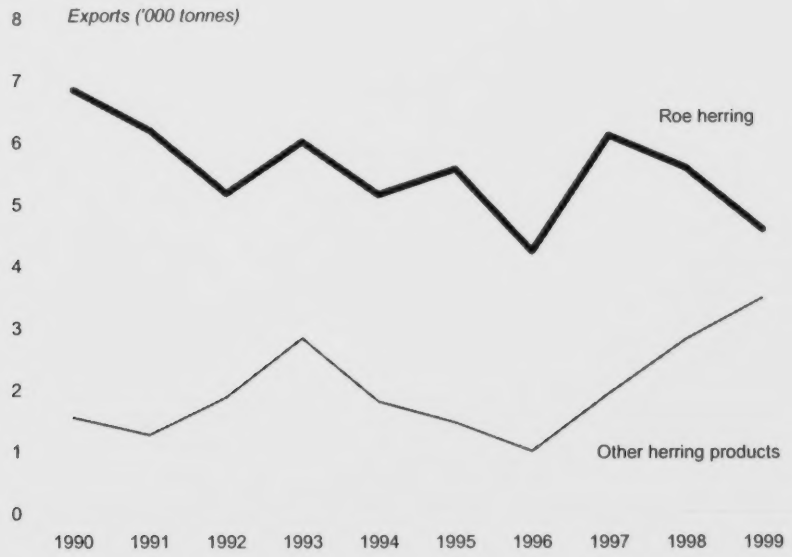

Figure 12

Value of the BC herring fishery

The landed value of BC herring, which is the amount paid to harvesters, also fluctuated during the 1990s, reflecting swings in the volumes being harvested but more particularly changes in price levels.

Herring's landed value increased by 22% through 1996 when earnings were $100 million compared to $82 million in 1990. However, despite growth in harvest volumes, the value of BC herring landings declined after 1996 due to sharply reduced prices for roe exports to Japan, reaching a low of $37 million in 1998. At the end of the decade, somewhat better prices produced a slight rebound in revenues for harvesters despite reduced landings.

During the latter half of the decade, the BC herring fishery was riding an economic roller coaster. In 1995 and 1996, reduced herring landings sold at higher prices resulting in higher landed values. For the remaining three years of the decade, higher harvest levels saw steeply lower prices for roe herring and the value of landings fell.

Wholesale and export values for BC herring followed a similar pattern of increases early in the decade followed by a decline, only with much larger swings. For example, the wholesale value of BC herring peaked at $211 million in 1995, then fell to $108 million by 1998 before recovering slightly to $119 million at the end of the decade. The value of BC herring exports peaked at $200 million in 1996, fell dramatically the following year, and was $100 million in 1999.

Landed, wholesale and export values for BC herring rose then fell during the 1990s

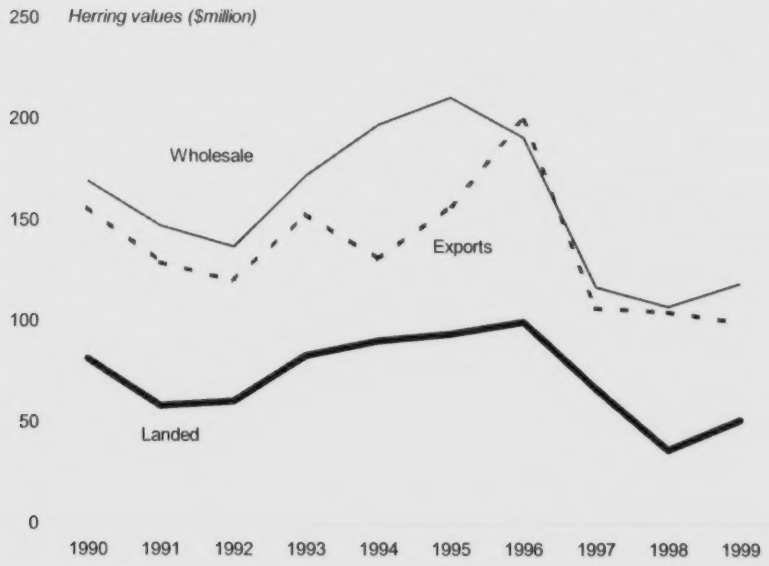

Figure 13

Roe herring dominated BC herring export value during the 1990s but lost some of its share to the food and bait fishery later in the decade. Roe herring exports averaged 97% of the total value of BC herring exports during the 1990s. However, by 1999, the other herring products accounted for 7% of the value of herring exports, compared to 2% in 1990.

Price levels for BC herring

BC herring displayed considerable price swings during the 1990s. For example, the landed price for BC herring averaged $1.97 per kg in 1990, and stayed at about that level through 1994. Over the following two years, prices rose dramatically to reach $4.42 per kg by 1996, only to drop sharply the next year. In 1998, herring landed price bottomed out at $1.08 per kg, recovering somewhat in 1999 to $1.73 per kg.

Average wholesale prices for herring followed a similar pattern and peaked at $8.47 per kg in 1996. Wholesale to landed price ratios were generally in the 1.8 to 2.5 range, with 1998 being an exception at 2.9.

Prices paid for exported BC herring products were significantly above landed and wholesale price levels, and were also considerably more volatile. For example, in 1996, export prices increased to almost $39 per kg. The following year, with the downturn in the Japanese economy (the biggest market for BC roe herring), the average price for herring exports fell to $13 per kg and remained at about that level for the rest of the decade. Exchange rate effects also played a role.

Herring prices rose through 1996, and then fell, with particularly large swings seen in export prices

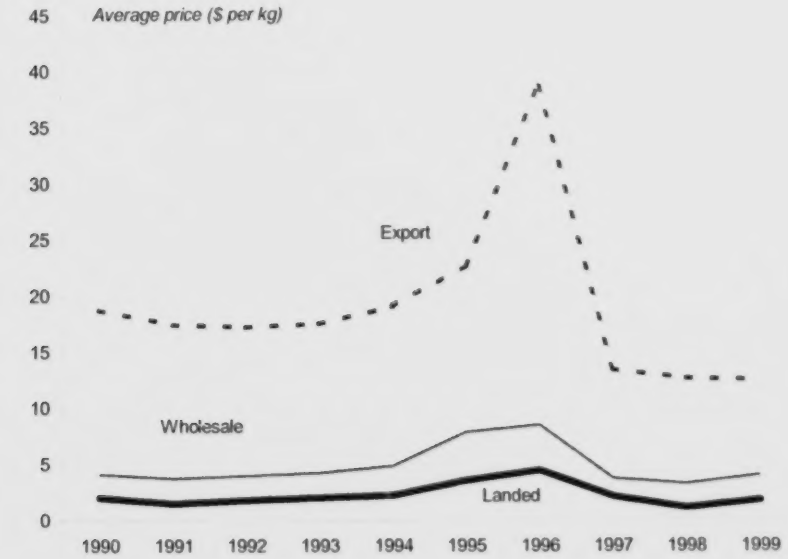

Figure 14

Landed prices for roe herring increased and then fell sharply, while prices for food & bait herring rose dramatically in 1998

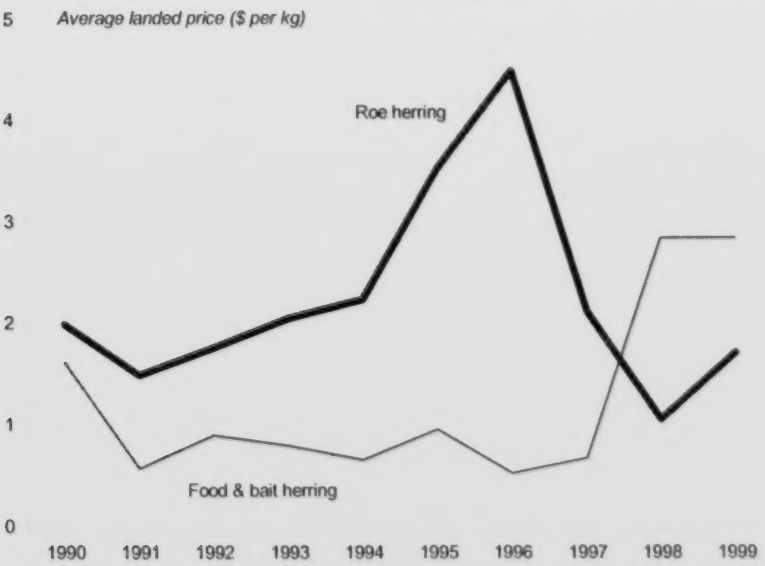

Figure 15

The landed price for herring overall essentially follows price movements for roe herring since the roe fishery dominates the BC herring harvest. The food and bait fishery, although very small, exhibited quite a different pattern in price movements over the decade, with prices up sharply for 1998 and 1999.

Herring's position in the BC commercial fishery

The herring fishery is an important component of the BC commercial fishery. During the 1990s, herring averaged 14% of wild finfish landings, and stood at 15% in 1999. As herring commands higher than average prices compared to wild finfish generally, these landings translated into 22% of landed value and 23% of wholesale value over the decade. Figures for 1999 were 24% of wild finfish landed value and 23% of wholesale value.

While herring's share of BC fish landing volumes was reasonably level over the decade, the value of the herring harvest was particularly high in 1995 and 1996 due to high prices. In those two years, herring represented around 30% of BC wild finfish sales, both landed and wholesale.

BC herring is also an important higher-priced fish product export. As a share of total fish product exports during the 1990s, herring averaged 5% of product quantity shipments and 17% of value. While herring's share of shipment volumes did not vary all that much, there was considerable fluctuation in its share of export sales. For example, in 1996, herring represented 24% of the value of BC fish product exports. In 1999, that figure was 12%.

6. Halibut

Pacific halibut[6] is a highly valued commercial fish. The Canadian and US fishery is regulated by the International Pacific Halibut Commission which establishes the total allowable catch, season length, and related matters. The fishery is also regulated by the Canadian and US governments. Beginning with the 1990s, most BC-caught halibut was sold to the fresh rather than frozen market, and the Canadian fishery operated under a limited entry and Individual Vessel Quota (IVQ) management system.

Landings and exports

In 1990, BC's commercial catch of halibut[7] was 3.8 thousand tonnes. During the rest of the decade, BC halibut commercial landings increased quite considerably and stood at 5.5 thousand tonnes in 1999, a rise of 45% compared to 1990.

BC's halibut catch increased steadily after 1991 with most of this product destined for export

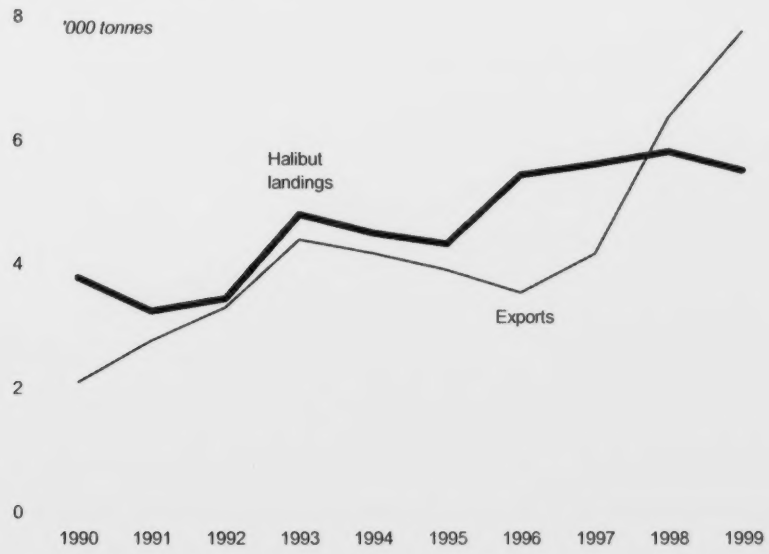

Figure 16

Over the decade, commercially landed BC halibut was increasingly sold internationally. In 1990, BC halibut exports totalled 2.1 thousand tonnes. Nine years later, in 1999, halibut exports were 7.7 thousand tonnes. The volume of exports exceeded BC halibut landings in that year, largely due to the re-export of

[6] Halibut is reported separately from other groundfish because the landed value of the catch represents a substantial share of total landed value for the commercial fishery. It is recognized that the catch of other groundfish species such as hake is significant, however, it was not possible to profile every major species.
[7] This includes some halibut that is landed directly in Alaska and Washington State

US-caught fish. In 1999, BC imported 2.1 thousand tonnes of fresh US halibut and 2.9 thousand tonnes of frozen product excluding frozen halibut fillets.

Since 1990, fresh halibut has dominated BC halibut sales. In 1990, fresh product was 78% of halibut exports. The share increased to 98% by 1993, and has remained above 90% during the rest of the decade.

Virtually all exports of BC halibut during the 1990s were destined for the US. In 1999, for example, sales to the US represented 95% of exports. The next largest market for BC halibut was the European Union, which had just a 5% share.

Value of the BC halibut fishery

The landed value for BC halibut, the price that is paid to harvesters, also increased during the 1990s. At the beginning of the decade, the landed value of commercially caught BC halibut stood at $21 million. In 1999, that value was $39 million, for a rise of 84% over nine years. Similarly, the wholesale value for BC halibut products grew from $28 million at the beginning of the decade to $59 million in 1999, representing a 111% increase. The value of halibut exports rose 457%, increasing from $14 million in 1990 to $78 million in 1999.

Landed, wholesale and export values for BC halibut all posted healthy increases during the 1990s

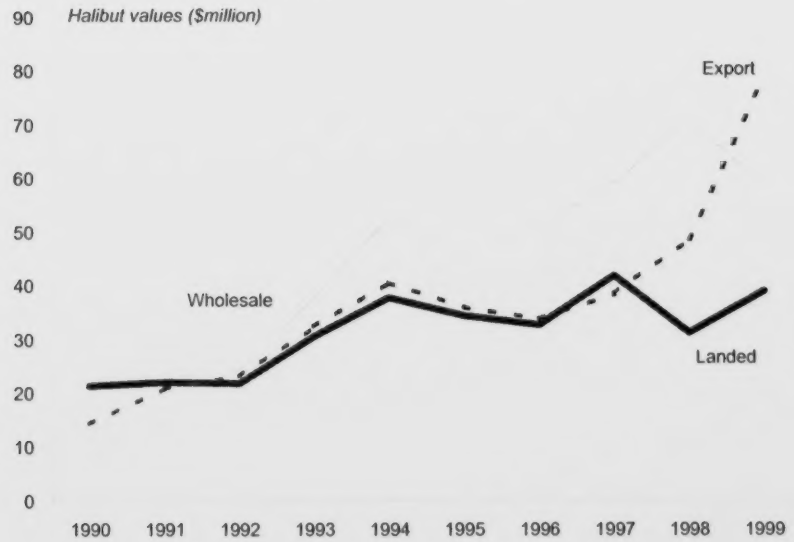

Figure 17

Price levels for BC halibut

Halibut saw large price rises during the decade, reflecting changes in the product mix (including the effect of imports from the US) as well as other factors. The landed price paid to BC halibut harvesters increased by 26%, from $5.57 per kg

in 1990 to $7.04 in 1999. Similarly, average wholesale prices for halibut increased, rising from $7.34 to $10.64 per kg over the period, or 45% over nine years. The ratio of wholesale price to landed price for BC halibut fluctuated within the 110% to 157% range during most of this period.

Prices received for exported product also increased during the 1990s, from $6.70 per kg in 1990 to $10.09 per kg at the end of the decade, for a 51% increase. However, export prices for halibut remained somewhat below wholesale prices for BC halibut products generally. This may be because there is usually little added-value processing in halibut exports.

Halibut prices rose during the 1990s

Figure 18

Halibut's position in the BC commercial fishery

Halibut is a high-value product that has assumed a larger role in the BC commercial fishery in recent years, particularly with the decline of the wild salmon harvest during the 1990s.

In terms of landed volumes, halibut's share of BC wild finfish harvest stood at 1% in 1990, rising to 3% by 1999. In quantity terms, most of the reduced share of landings for wild salmon has been taken up by the ongoing larger harvest of other groundfish species.

However, with the decline of the salmon fishery and the resulting increased harvest share for lower-valued groundfish, halibut's share of the value of BC finfish landings grew from 5% in 1990 to 18% in 1999. Over the same period, halibut's share of BC finfish wholesale value rose from 3% to 11%. The lower share for wholesale value compared to landed value for halibut indicates that less processing is applied to this species than is the case with other wild finfish.

7. Other Groundfish Species

The BC commercial fishery harvests a wide range of other groundfish species including: hake, rockfish, sole, sablefish, turbot, dogfish, lingcod, pollock and cod. With the exception of sablefish (which is harvested by trap), these fish are landed mainly by the groundfish trawl fishery, which is the largest BC fishery based on the volume of landings. The groundfish trawl is a year-round fishery providing continuing employment for both harvesters and fish processors.

Landings and exports

Commercial landings of groundfish fluctuated considerably during the 1990s. The preliminary figure for the 1999 groundfish catch is 139 thousand tonnes, which is essentially the same level as reported at the beginning of the decade.

BC's groundfish harvest fluctuated during the decade with most product destined for domestic markets

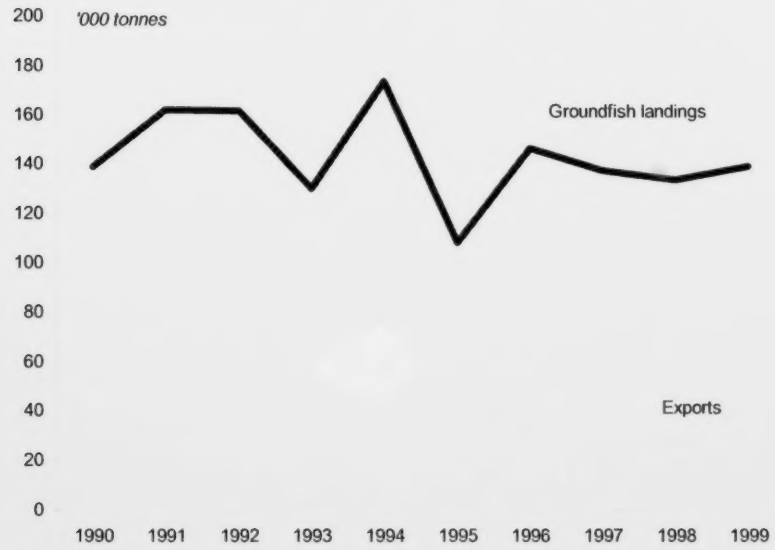

Figure 19

With the decline of the wild salmon harvest, groundfish has assumed an increasing share of commercial fish landings by volume for the province. In 1990, groundfish accounted for 49% of wild finfish landings. At the end of the decade that figure stood at 72%.

Landing volumes for main species

Twenty-seven different groundfish stocks are assessed and assigned an annual total allowable catch. However, groundfish landings during the 1990s were dominated by the fishery for just one product: hake. In 1990, hake stood at 57% of groundfish landings by volume and was 67% at the end of the decade.

Rockfish share increased only somewhat over the decade, growing from 16% of groundfish landings in 1990 to 17% ten years later. Shares for sole and sablefish (Alaska black cod) landings declined slightly, to 4% and 3% respectively.

Landed volumes for the BC groundfish fishery were increasingly dominated by hake during the 1990s

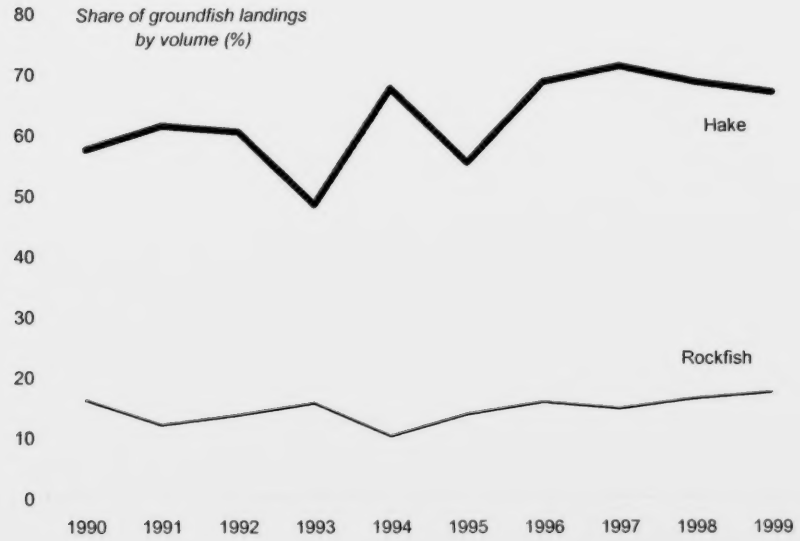

Figure 20

Pacific cod accounted for 5% of groundfish landings in 1990, but was less than 1% of harvest ten years later. Over the decade, landings for this product declined from 6.2 thousand tonnes in 1990, to 800 tonnes. Reduced landing levels reflect a decline in Pacific cod stocks during the decade and the resulting management actions. Prior to 1992, the total catch of Pacific cod was relatively unrestricted.

Value of the BC groundfish fishery (excluding halibut)

Groundfish exports are generally higher-valued groundfish species (both raw and processed). The landed value of BC groundfish grew from $67 million in 1990 to reach the $100 million level at the end of the decade, for a rise of 50% over nine years. Similarly, the wholesale value for groundfish increased 41% over the decade, rising from $116 million in 1990 to $164 million in 1999. The ratio of wholesale to landed value for groundfish, an indicator of value-added processing effort, averaged 162%, and ranged between 139% and 177%, during the 1990s.

The value of groundfish (raw and processed) exports was quite similar to the fishery's total landed value figure during the decade, although exports represented a much smaller share of landed volumes. This situation is due to the product mix for exports, as higher-valued groundfish products dominate the

value of BC export sales. For example, sablefish accounted for between 30% and 40% of the value of BC groundfish exports after 1992, but just 6% to 10% of exports by volume over the same period. All exported sablefish during the period was frozen product. Most of the sablefish is head/gutted using a "J" cut, frozen at sea, and exported to Japanese markets. During most of the 1990s, well in excess of 80% of BC sablefish export value represented sales to Japan.

Wholesale and landed value increased over much of the decade, as did the value of groundfish exports

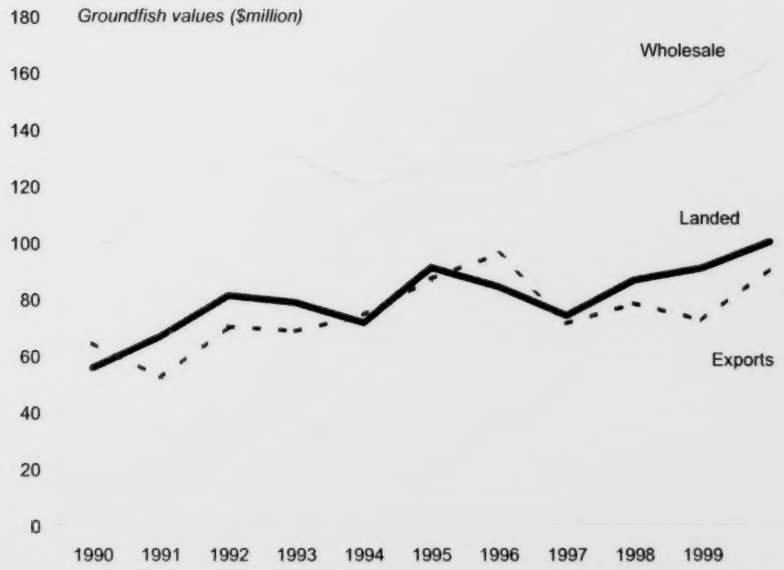

Figure 21

Landed and wholesale values for main species

Looking at the main groundfish species harvested in BC, sablefish averaged 33% of landed value for BC groundfish during the 1990s, but just 24% of wholesale value. Rockfish averaged 25% of BC groundfish landed value, and 23% of wholesale value, with its share increasing considerably after 1995.

Sablefish had the greatest share of groundfish landed value during the 1990s, while rockfish share rose considerably

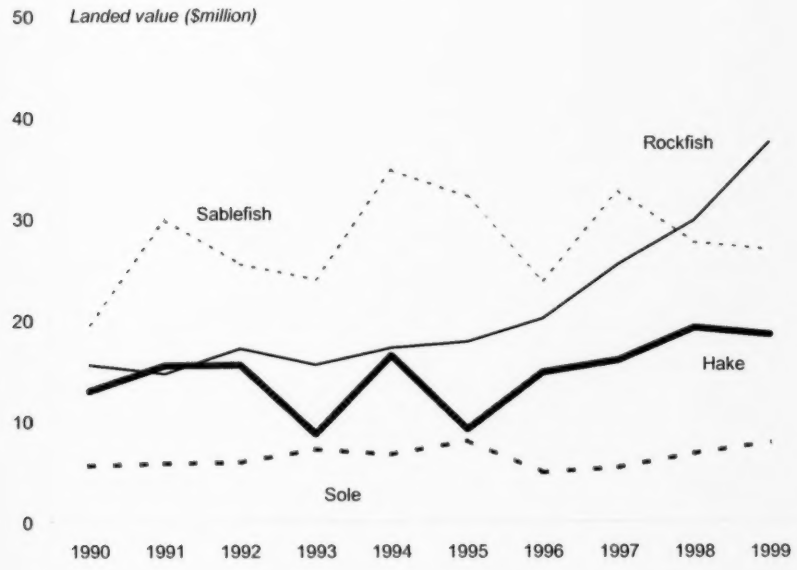

Figure 22

Rockfish and hake had a growing share of wholesale value

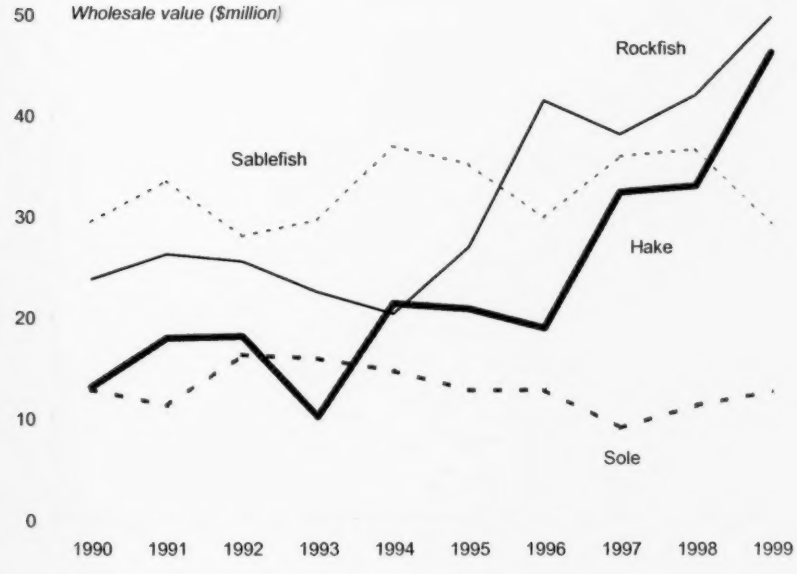

Figure 23

Hake, by far the largest groundfish fishery in terms of volume, averaged an 18% share of landed value and 16% of wholesale value during the 1990s. Further, while the trend for hake share of landed value was reasonably flat, increased on-shore allocations contributed to a growing share of wholesale value for this species. Sole averaged 8% of landed and 10% of wholesale value.

Price levels for BC groundfish (excluding halibut)

Compared to the halibut and wild salmon fisheries, the BC groundfish fishery harvest is primarily lower-valued products. Although they increased during the decade, BC groundfish landed prices averaged just $0.59 per kg. In 1990, the average landed price was $0.48 per kg. At the end of the decade, this figure had reached $0.72 per kg, for an increase of 50% over nine years. Wholesale prices for groundfish averaged $0.95 over the decade, rising 41% from $0.84 per kg in 1990 to $1.18 per kg in 1999.

Export prices for BC groundfish products rose significantly during the 1990s, but landed and wholesale prices changed little. This reflects, among other factors, a change in the product mix for groundfish exports.

Figure 24

A higher-priced BC groundfish product mix is sold internationally. During the 1990s, the export price for BC groundfish averaged $2.32. However, the price of groundfish exports increased from $1.70 per kg in 1990 to $3.57 for 1999, a rise of 110%. This price increase was due largely to a shift in product shares being exported, but also reflects exchange rate effects.

Price trends for main groundfish species

There is considerable variation in the prices paid for the BC groundfish species. For example, the landed price for hake averaged only $0.16 per kg over the decade and was $0.20 per kg for 1999. Sole averaged $0.96 per kg and was $1.39 per kg at the end of the decade. Over the period, rockfish landed prices averaged $1.03 per kg, and rose substantially to $1.56 per kg by 1999. Sablefish was by far the most valuable BC groundfish in this group, with an average landed price of $6.08 per kg during this period, only slightly less than the average landed price received for halibut ($6.68).

Sablefish was the most valuable species in this group

Figure 25

8. Wild and Cultivated Shellfish

The BC shellfish industry includes both the wild fishery and shellfish aquaculture, with the wild shellfish harvest predominating. Shellfish species harvested in BC include: clams, crabs, geoduck clams, oysters, sea cucumbers, shrimp and prawns, and sea urchin.

Landings and exports

BC's commercial harvest of shellfish grew considerably through 1992, when landings reached 31.5 thousand tonnes compared to 21.5 thousand tonnes at the beginning of the decade. After 1996, landings declined somewhat and stood at just 24.0 thousand tonnes in 1999.

Most of the fluctuation in BC shellfish harvest levels was in the wild fishery, including a one-time doubling of sea urchin landings in 1992 to 14.1 thousand tonnes, followed by the introduction of fishery management quotas and area restrictions. Shellfish aquaculture output, which averaged 20% of the shellfish harvest over the decade, increased steadily to 6.7 thousand tonnes, up 47% from the 4.6 thousand tonnes harvested 1990.

BC's harvest of mainly wild shellfish trended up until regulations reduced shrimp landings in 1997

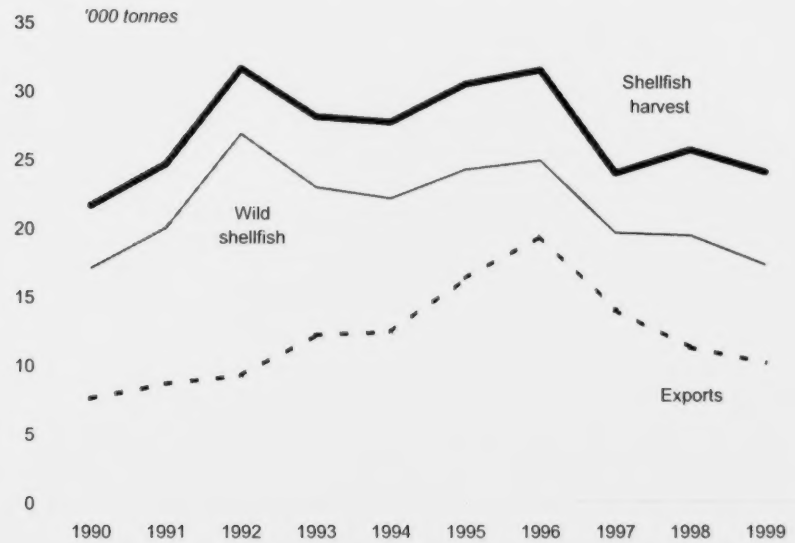

Figure 26

The decline in wild shellfish landings in the latter part of the decade was mainly due to the introduction of conservation measures for the BC shrimp trawl fishery. The fishery had expanded rapidly during 1995 and 1996 due to abundant BC stocks, increased fishing effort associated with changes in the BC groundfish and salmon fisheries, and a decline in the Washington and Oregon shrimp

fisheries. The BC shrimp fishery management plan was changed substantially in 1997 and a new monitoring system introduced, resulting in a 45% drop in commercial landings of shrimp in that year. Crab landings also declined after 1996 due to reduced stocks.

During the 1990s, BC shellfish exports averaged 12.0 thousand tonnes. As well, shellfish export sales tracked the rise and later the decline in shellfish commercial landings over the decade.

Landing volumes for main shellfish species

While the BC shellfish fishery harvests many different species, just a few are harvested in large volumes. For the wild shellfish harvest, the largest landings were for sea urchin, averaging 6.8 thousand tonnes over the decade; shrimp and prawns at 5.2 thousand tonnes; and crab at 3.9 thousand tonnes.

The harvest of sea urchin, and later shrimp, expanded rapidly before the implementation of fishery restrictions designed to sustain stocks

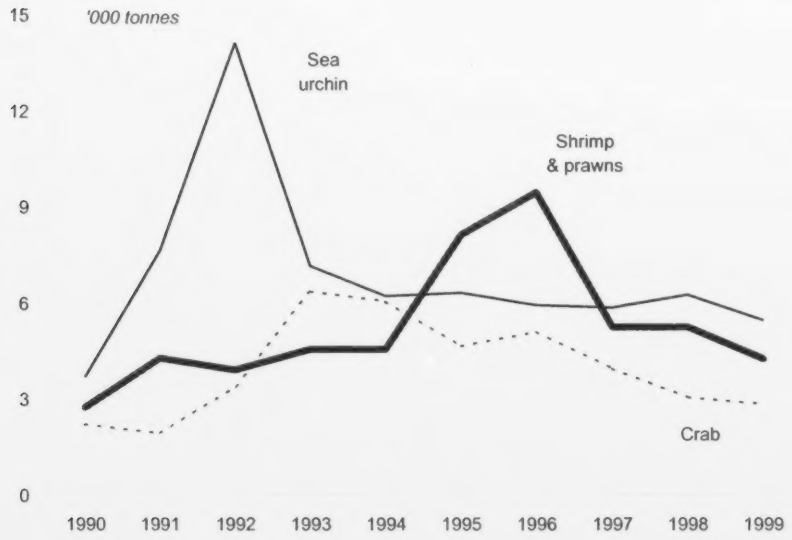

Figure 27

During the 1990s, the volume harvested by the sea urchin fishery, and later by the shrimp trawl, was marked by a brief production spike resulting from increased fishing, then declined following the introduction of fishery restrictions designed to return the harvest to sustainable levels. The crab harvest increased during the early years of the decade, but generally declined after 1994 due to reductions in the population available for harvest.

The BC red sea urchin dive fishery began in the 1970s. The product is processed at BC plants where roe is extracted. Green sea urchins, harvested by a more recent fishery that began in 1987, are shipped whole and live to Japan.

Landings of geoduck clams, a wild shellfish, were much reduced over the decade due to a fixed limit on the number of licences for the fishery, the introduction of individual licence quotas, and a reduction in quota levels.

The harvest of wild geoducks declined during the 1990s due to strict management of the fishery

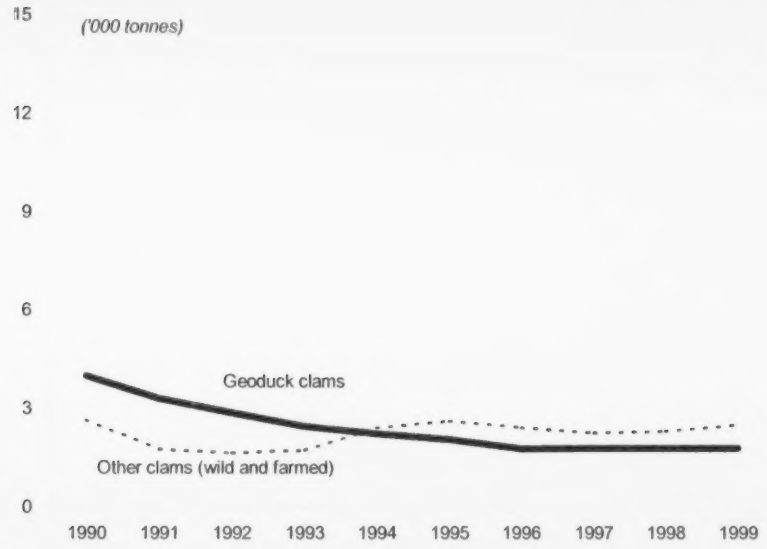

Figure 28

For BC clams, the harvesting of wild product averaged 1.7 thousand tonnes over the decade while production of farmed clams averaged 0.6 thousand tonnes. The harvest of wild clams declined significantly in the early part of the decade, and remained lower due to the introduction of more restrictive fishery management measures. Clam aquaculture, which was virtually non-existent at the beginning of the decade, generally increased during this period. In 1999, BC farmed clam production was 0.9 thousand tonnes compared to 1.6 thousand tonnes for wild product.

Value of the BC shellfish fishery

The landed value of BC shellfish rose sharply from $46 million at the beginning of the decade to reach $127 million in 1996, followed by a considerable downturn. By 1999, the value of BC shellfish landings had fallen to $104 million. However, this value was 125% above payments to BC shellfish harvesters at the beginning of decade.

The export value of BC shellfish averaged $113 million over the decade. Export sales rose sharply with increased landings early in the decade to over $150 million in 1995 and 1996, and maintained this level into 1997. At the end of the decade, BC shellfish exports were valued at $124 million. The wholesale value of BC shellfish increased by 131% during the 1990s, and totalled $159 million in

1999. Unlike values for landings and exports, wholesale values did not drop appreciably at the end of the decade.

Shellfish wholesale and export value grew until later in the decade, while wholesale values rose over the whole period

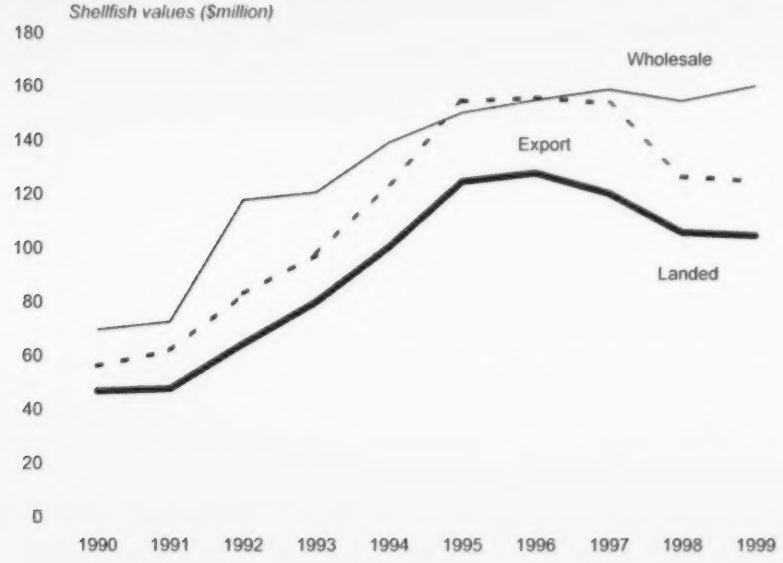

Figure 29

Landed values for specific shellfish

Trends in landed values for specific shellfish species generally followed changes observed in landed quantities, with certain differences reflecting the larger price variations.

Taken together, geoduck clams, shrimp and prawns, and crab represented 73% of BC shellfish landed value during the 1990s. Geoduck clams had the highest landed value, averaging $27 million over the decade, and valued at $34 million in 1999. Shrimp and prawns were next, averaging $22 million; followed by crab, with a landed value averaging $19 million annually.

Among the remaining BC shellfish products, sea urchin landings averaged $9.4 million, clams $6.5 million, and oysters (a farmed product) $4.5 million. For clams, wild product held a higher share of landed value at $4.1 million compared to $2.3 million for farmed clams. Another product of note was sea cucumbers, which averaged just under $1 million dollars, and had a landed value of $1.5 million in 1999.

Landed values for shrimp and prawns rose sharply then declined, while crab value was maintained despite a reduced harvest

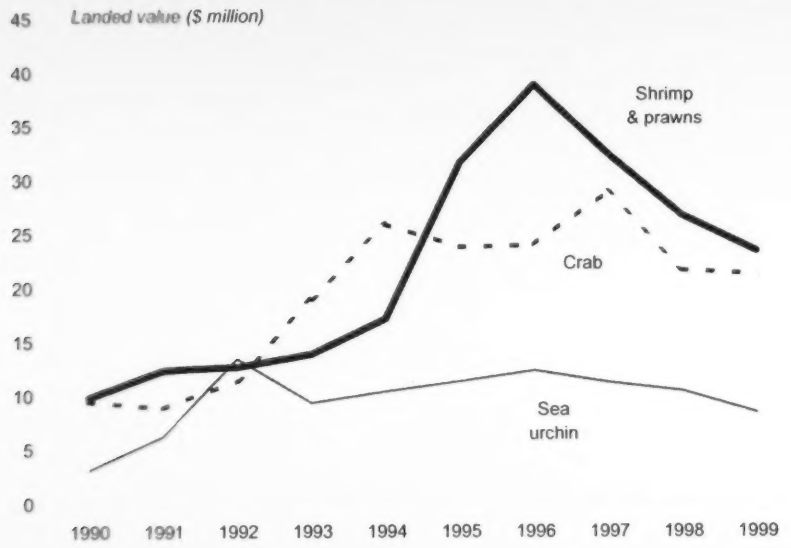

Figure 30

Geoduck landed value grew until 1995, but has since fallen

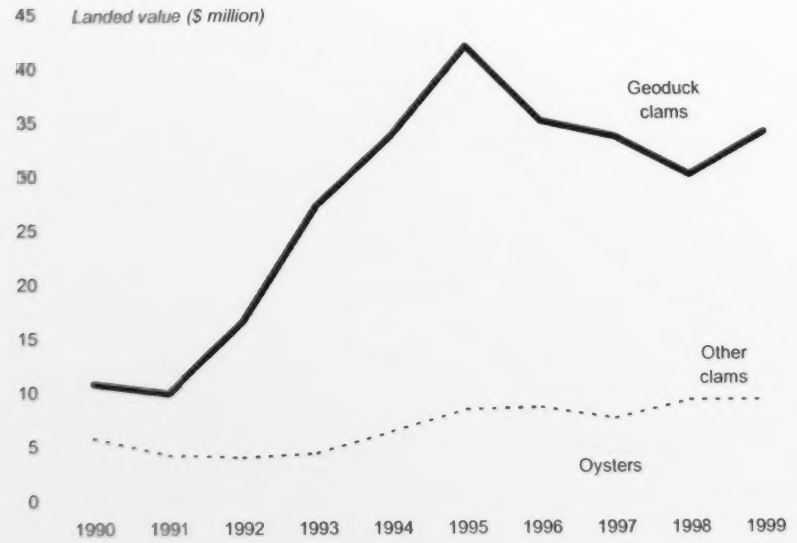

Figure 31

Average price levels for BC shellfish

Landed and wholesale prices for BC shellfish increased during the 1990s. Landed prices averaged $3.40 per kg and stood at $4.32 in 1999, for a rise of 102% compared to 1990. Wholesale price levels, which averaged 45% above landed price with relatively little variability among specific shellfish products increased by 108% over the decade.

Average price levels rose significantly for BC shellfish

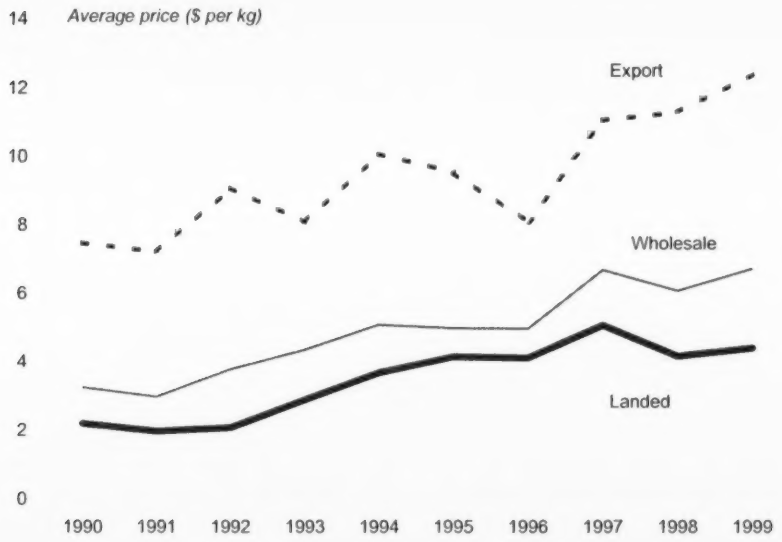

Figure 32

Average prices received for shellfish exports were much higher than wholesale prices due to the emphasis on higher-value products such as geoduck, clams and crab. In addition, export prices for all species reflect the effect of exchange rate fluctuations during the 1990s as well as the effect of changes in processing and handling.

Price variations among BC shellfish species

Prices varied considerably among the various BC shellfish species. By far the most valuable shellfish was geoduck clams. The landed price for this species averaged $13.09 per kg over the decade, and was $18.72 in 1999, representing a 606% rise over 1990 levels.

The particularly high prices received for this product were due to continuing strong demand from the Far East (Hong Kong, in particular) combined with a much reduced and managed harvest concentrating on sales to that market. At the same time, the product mix has changed, with fresh and live geoducks making up a bigger share of exports. The average export price for BC geoduck products in 1999 was $26 per kg.

Crab landed prices averaged $5.13 per kg during the 1990s, finishing the decade at $7.50 per kg, for an increase of 75% over 1990 levels. Again, international demand played a significant role. The 1999 export price for crab was $10 per kg.

Shrimp and prawn landed prices averaged $4.13 per kg over the decade, and were generally higher after 1997, when the price paid to harvesters reached an average of $6.19 per kg. Export prices were significantly higher, averaging almost $6 per kg over the decade and exceeding $10 per kg in 1999.

Among lower-value shellfish products, the landed price of clams averaged $2.87 per kg over the decade and was $3.56 per kg in 1999. Higher prices were paid for farmed products. For oysters, landed (farmgate) prices averaged just $0.92 per kg, finishing the decade at $1.03.

Sea urchin landed prices averaged $1.44 per kg during the 1990s, and were $1.52 per kg in 1999, with wholesale prices a little more than twice that level. By comparison, export prices for this product were over $13 per kg in 1999.

9. Salmon Aquaculture

BC is the world's fourth largest producer of farmed salmon, after Norway, Chile and the UK. Atlantic salmon is the predominant species for salmon aquaculture in British Columbia, followed by chinook and coho farming.

Salmon aquaculture harvest

During the 1990s, the harvest of BC farmed salmon grew very rapidly. For 1990, salmon aquaculture output stood at 15.5 thousand tonnes. At the end of the decade, production levels had reached 49.1 thousand tonnes, a rise of 313% over ten years.

BC's harvest of farmed salmon increased rapidly during the 1990s along with exports

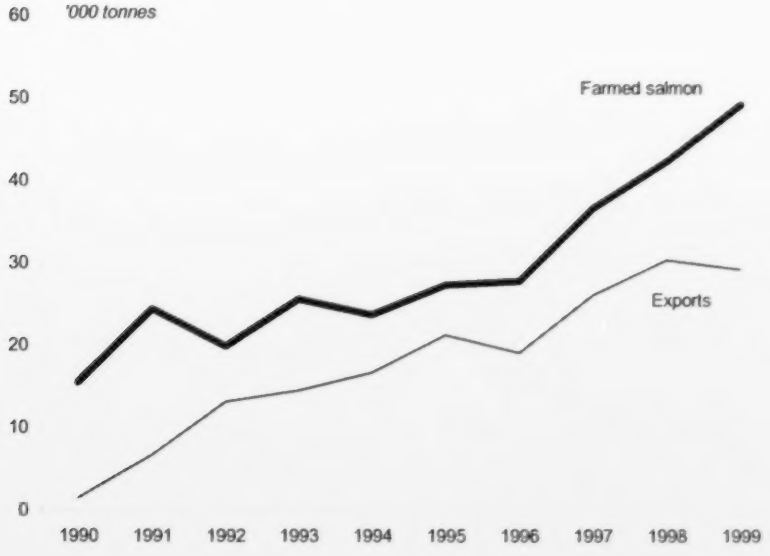

Figure 33

International exports of BC farmed salmon also grew as aquaculture output increased from just 1.4 thousand tonnes[8] in 1990 to a total of 29.2 thousand tonnes being sold internationally at decade's end. In 1990, 89% of farmed salmon exports were destined for the US. This figure increased to 95% in 1991, and has remained at about that level since then.

The production of Atlantic salmon dominated BC's salmon aquaculture industry during the 1990s, averaging 61% of harvest volume over the decade and increasing from 12% of 1990 production to 79% of output in 1999. Early in the 1990s, chinook salmon, an indigenous species, dominated BC's farmed salmon

[8] Although farmed salmon was not explicitly defined as an export category until 1991, exports of all Atlantic salmon from BC were assumed to be farmed since the species is not indigenous to BC waters.

production, peaking at 20.1 thousand tonnes in 1991 and declining in subsequent years. By 1993, the production of Atlantic salmon had overtaken the harvest of farmed chinook.

First chinook, and then Atlantic salmon, dominated BC's salmon aquaculture production during the 1990s

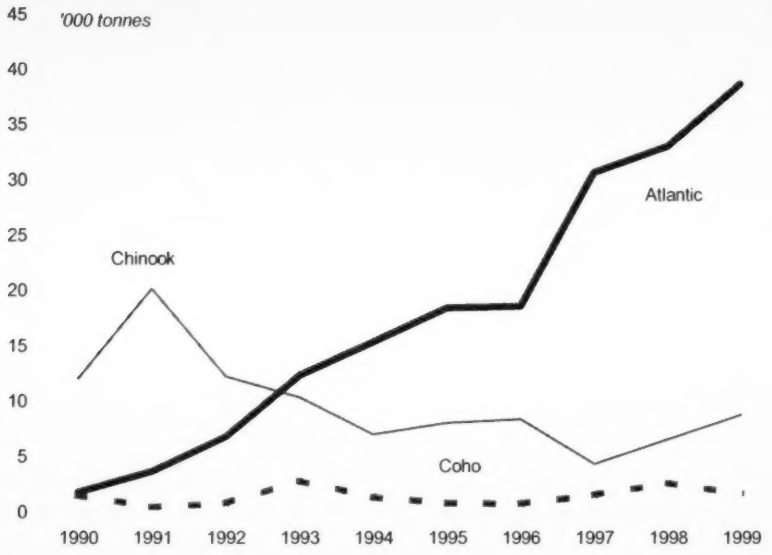

Figure 34

Value of the BC salmon aquaculture industry

With the large growth in production levels, the value of the BC farmed salmon also rose sharply during the decade. Farmgate receipts for farm-raised BC salmon were $79 million in 1990 and had reached $292 million by 1999. Further, BC farmed salmon production grew while the wild salmon harvest generally declined. By 1995, the farmgate value of BC salmon aquaculture exceeded the value of the wild harvest. Later, in 1999, farmed salmon quantity also stood higher than BC commercial landings of wild salmon.

Wholesale values for BC farmed salmon rose at a higher rate than farmgate value, particularly after 1996—indicating increased levels of added-value processing for BC farmed salmon product during the later years of the decade. To illustrate, from 1994 to 1996, wholesale values for BC farmed salmon products were just 1% to 4% above farmgate receipts. However, from 1997 on, the value of wholesale shipments of farmed salmon products from BC plants ranged from 13% to 30% above farmgate price.

Export values for BC farmed salmon increased by a factor of 20 during the decade, growing from $13 million in 1990 to $256 million in 1999.

Later in the 1990s, increases in the wholesale value of BC farmed salmon outpaced the rise in farmgate value

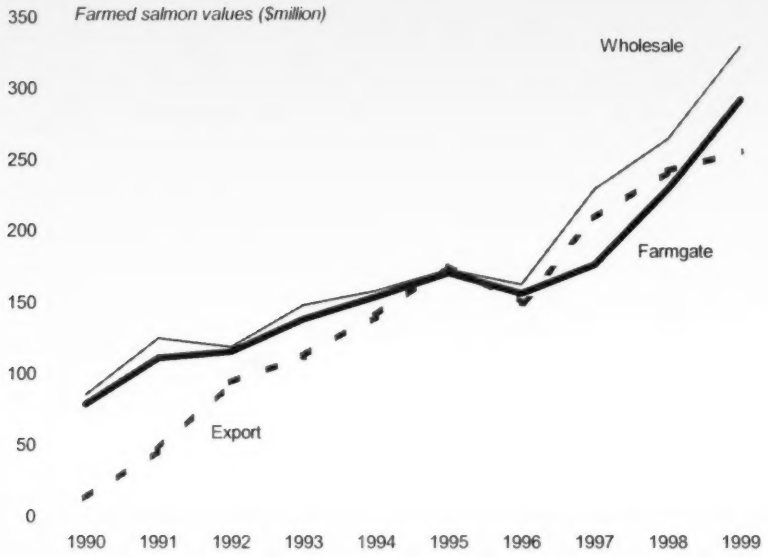

Figure 35

Price levels for BC farmed salmon

Compared to landed prices for wild product, the farmgate price for BC farmed salmon was significantly higher over the decade, averaging $5.54 per kg. The average price for wild salmon was $2.41 per kg.

Salmon farming focuses on producing a high quality product and getting it to market fresh rather than frozen. As well, average prices for wild salmon were kept down by generally lower prices for pink and chum salmon, particularly in recent years.

The farmgate prices paid for BC farmed salmon varied by species. For example, the price of farmed Atlantic salmon averaged $6.13 per kg over the decade compared to $5.59 for chinook and $4.46 per kg for farmed coho salmon. However, prices for BC Atlantic salmon generally declined after 1990 due to increased supply internationally, from $7.41 per kg that year to $5.80 per kg at decade's end, a 22% decrease. Prices for indigenous BC farmed chinook and coho rose by 31% and 72%, respectively.

Wholesale prices for BC farmed salmon averaged $6.05 per kg during the 1990s, just 10% above farmgate price and somewhat below the wholesale price for wild salmon. BC farmed salmon is a high-value product, with generally little added-value processing as much of the product is shipped fresh to retail outlets and the restaurant trade. As well, BC salmon farming operations have become more vertically integrated, handling both processing and product marketing. Looking at export prices, BC farmed salmon product sold at an average price of $7.99 per kg over the decade—well above the $6.11 per kg average price paid for wild salmon exports.

Farmgate and wholesale prices for BC farmed salmon increased, while export prices recovered from declines early in the decade

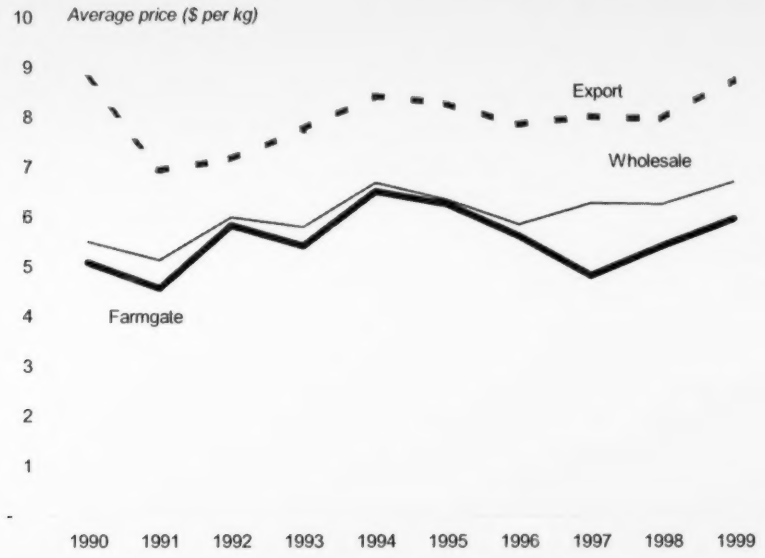

Figure 36

Average prices for Atlantic salmon declined, while prices rose for farmed coho and chinook salmon

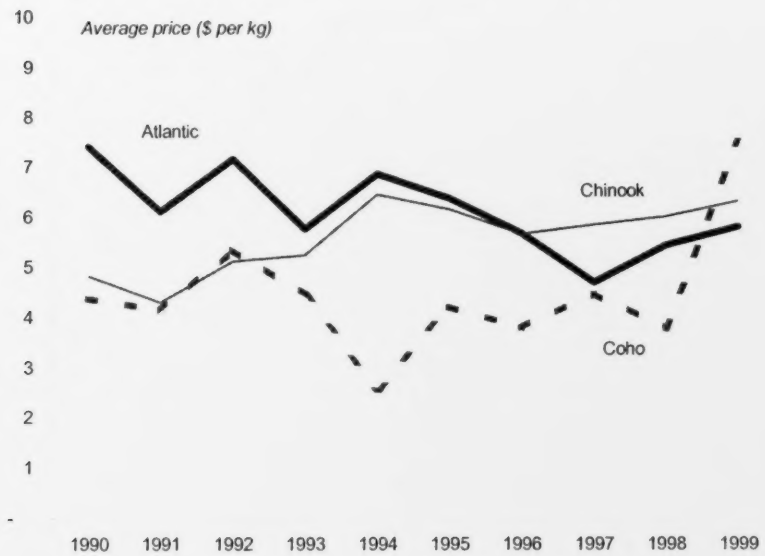

Figure 37

10. Shellfish Aquaculture

The BC shellfish aquaculture industry is concentrated primarily on the production of pacific oysters and manila clams. Virtually all of the commercial harvest of BC oysters is farmed, while cultivated clams averaged 25% of total BC clam production during the 1990s. Additionally, there is small-scale scallop and mussel aquaculture provincially, along with other shellfish being cultured in experimental quantities, including sea cucumber, sea urchin, geoduck clam, and abalone.

Shellfish aquaculture harvest

During the 1990s, the harvest of BC farmed shellfish grew considerably. Shellfish aquaculture production stood at 4.6 thousand tonnes in 1990. At the end of the decade, the production level was 6.7 thousand tonnes, a rise of 46% over nine years.

Production of BC oysters, the product farmed in the greatest quantities, grew during the 1990s, averaging 4.9 thousand tonnes, and reaching 5.8 thousand tonnes in 1999. Oyster production was 28% higher at the end of the decade than in 1990. Farmed clams, for which commercial production in 1990 was just 39 tonnes, increased to 0.9 thousand tonnes by 1999, and accounted for 13% of farmed shellfish production in that year.

BC's harvest of farmed shellfish grew steadily, with reduced volumes seen only in 1997, when there was a vibrio outbreak during the summer

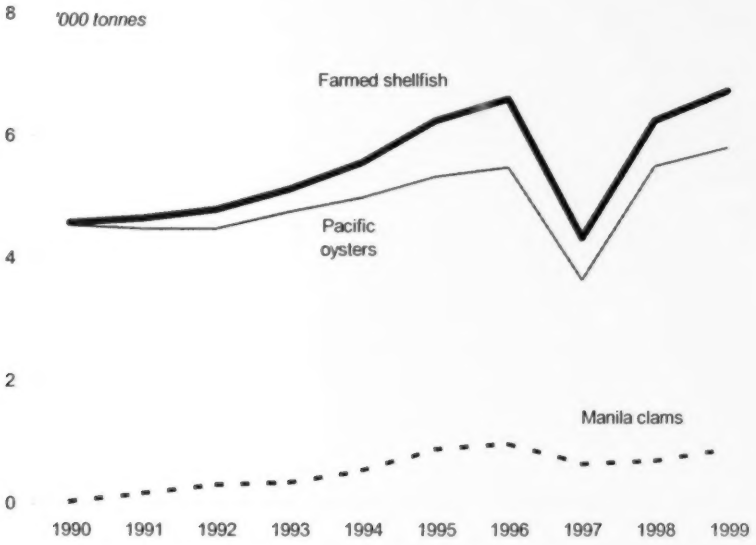

Figure 38

Value of the BC shellfish aquaculture industry

Values for BC farmed shellfish also grew sharply, albeit from a small base, with increases of 166% for farmgate receipts and 290% at the wholesale level. In dollar terms, farmgate value was $3.8 million at the beginning of the decade and had reached $10.0 million by 1999. Wholesale value rose from $4.6 million to $17.9 million.

The wholesale value of farmed shellfish increased at a higher rate than farmgate value over the decade

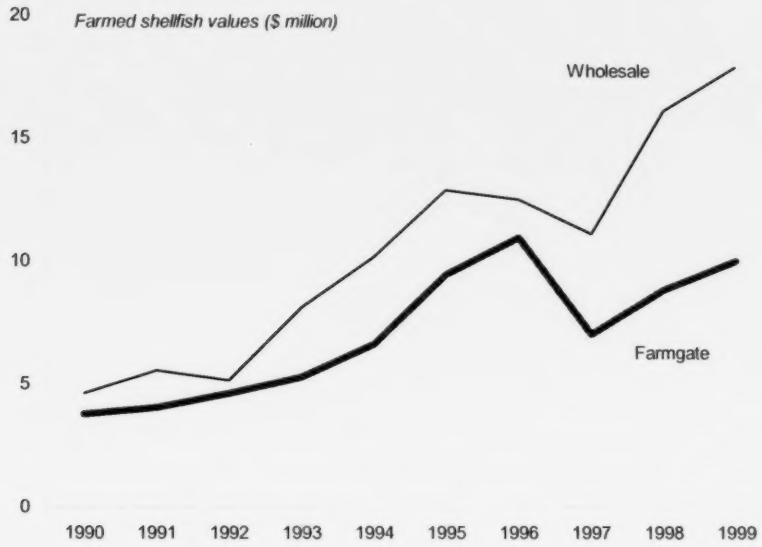

Figure 39

As well, in 1990, the wholesale value of BC farmed shellfish was just 21% above farmgate receipts, indicating that only limited added-value processing was being done by the industry. By the end of the decade, however, wholesale value was 179% of aquaculture farmgate sales.

Over the period, farmed clams assumed an increasingly larger share of the farmgate and wholesale value of BC shellfish aquaculture, as commercial production of clams increased. The increase in this product's share of the total value of production also reflects the higher prices received for farmed clams.

Farmed clams have assumed an increasing share of shellfish aquaculture output and value

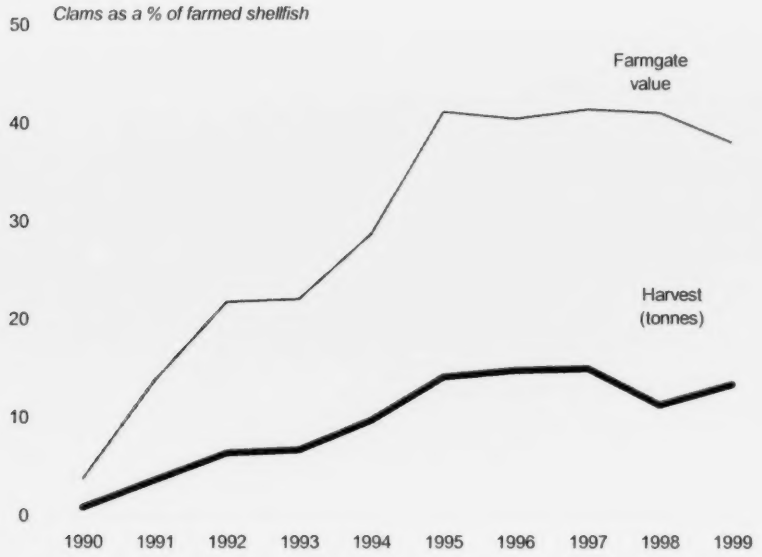

Figure 40

Price levels for BC farmed shellfish

Compared to wild shellfish species, BC's farmed shellfish is a considerably lower priced product. During the 1990s, the landed price for farmed shellfish averaged $1.25 per kg, which was less than one-third the $3.98 per kg received for wild species. Nevertheless, the farmgate price for BC cultured shellfish increased by 82% over the decade, with farmed clams receiving considerably higher prices than oysters. In 1999, for example, farmed clam prices (at the farmgate) averaged $4.22 per kg, more than four times the $1.03 per kg average price received for oysters. Wholesale prices displayed a similar pattern.

Export prices and markets for BC farmed shellfish

Export statistics are available for BC farmed oysters, but not separately for farmed clams. For oysters, export prices averaged $3.59 per kg, which was 3.9 times farmgate price. Most exports were to the US and Hong Kong.

For total BC clam exports (including wild product, but not geoduck clams), the export price averaged $6.05 over the decade, or 2.2 times the average landed and farmgate prices. Virtually all BC clam exports were to the US.

11. Fish Processing

The BC fish processing industry includes those establishments primarily engaged in processing finfish, shellfish, and other marine animals and plants. For statistics prepared by Statistics Canada, this industry corresponds to SIC group 102: Fish Products Industry, or to NAICS group 3117: Seafood Product Preparation and Packaging.

Shipments

Statistics Canada reports that the value of shipments for the BC fish products industry stood at $785 million in 1990. Nine years later, shipments were valued at $469 million, a decline of 40%. There was a brief resurgence in shipment values beginning in 1993 to reach $863 million in 1994. However, the value of shipments began to fall in 1995.

Shipments of BC fish products have fallen sharply since 1995

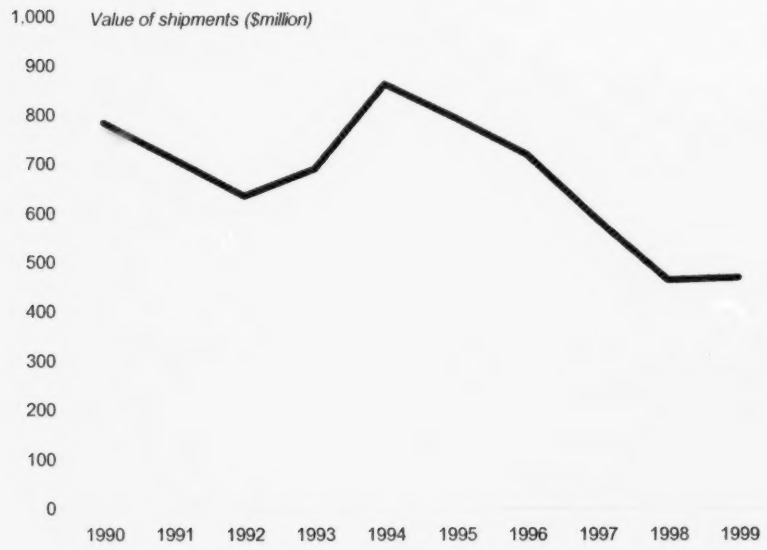

Figure 41

BC's share of the Canadian fish product industry's shipments also declined over the decade. In 1990, BC shipments were valued at 30% of the Canadian total. At the end of the decade, the figure stood at 15%.

Fish processing plants

The number of fish processing plants operating in the province declined during the decade, due in part to industry consolidation. BC Fisheries reported that there were 219 provincially licenced fish processing plants in 1990. Nine years later, this figure stood at 190 plants, for a decline of 13%. Vessels licenced to

process fish and companies leasing space in licenced fish processing facilities are not included in these statistics.

The overall decline in total BC fish processing plants during the 1990s masks quite different patterns of change among the regions. In particular, the reduction in plant counts occurred mainly on Vancouver Island, with a loss of 28 plants, or 33% compared to 1990 levels; and on the Sunshine Coast which had a net loss of 10 plants for a 56% decline. The Lower Mainland displayed a more cyclical pattern in licenced plant counts over the decade, with 100 plants operating in 1999 compared to 96 at the beginning of the decade. Elsewhere in the province, plant numbers increased from 21 facilities in 1990 to 26 at the end of the decade.

The number of fish processing plants decreased in Vancouver Island and the Sunshine Coast, but has rebounded elsewhere

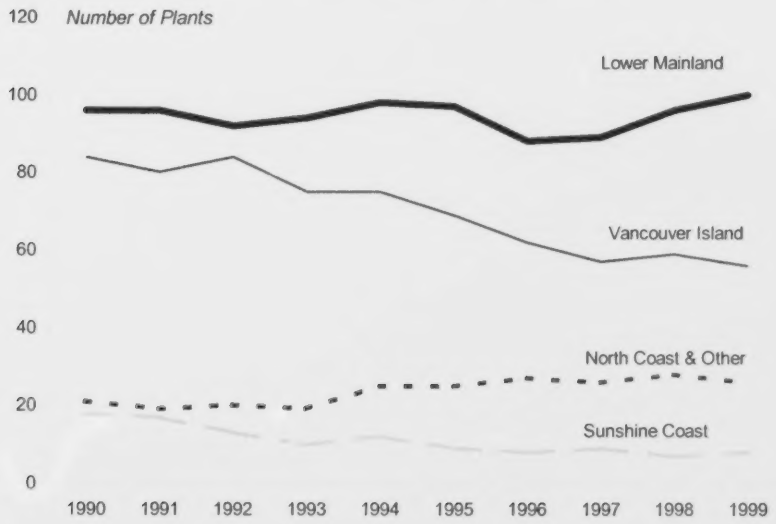

Figure 42

The considerable decline in fish processing facilities on Vancouver Island during the 1990s was not evenly spread across the region. In particular, although all areas of Vancouver Island experienced a net loss of fish plants during the decade, the effect was most dramatic and immediate for the Northern Vancouver Island region. At the beginning of the decade, the plant count for Northern Vancouver Island stood at 21. By 1992, there were just 5 licenced fish processing facilities in the region. By comparison, Southern Vancouver Island experienced considerable growth in its fish plant count early in the decade, followed by a general decline after 1992.

The North Coast (including Prince Rupert) has been the one area of the province with considerable growth in the number of fish plants, which increased 36% during the 1990s after a brief decline early in the decade. The total number of plants in this region was quite small, however, peaking at just 17 in 1996.

The number of fish processing plants in Northern Vancouver Island fell substantially at the beginning of the decade

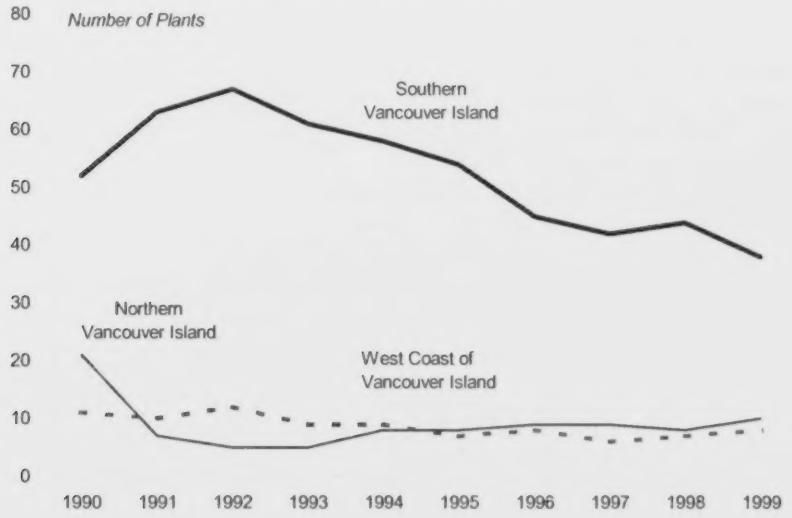

Figure 43

However, the number of fish processing plants in the North Coast region increased

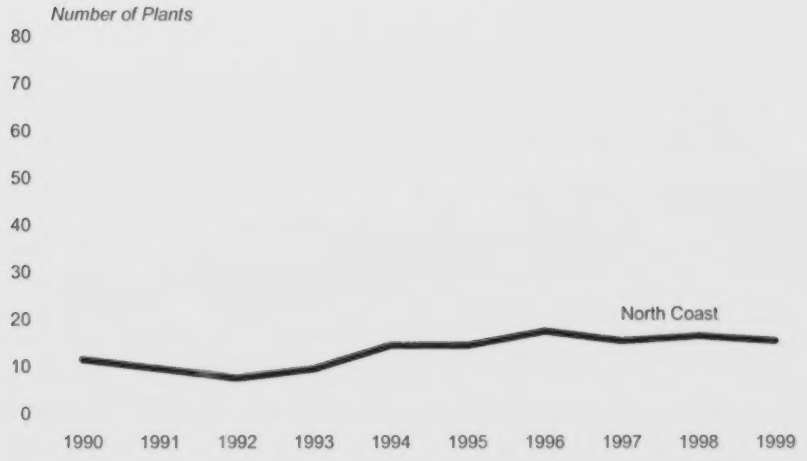

Figure 44

12. Added-Value Processing

In recent years, there has been a greater emphasis on added-value processing, which increases the wholesale value of BC fish products while supporting jobs and improving the industry's profile. This can include further processing of traditional products; changes in handling or processing that improve the quality of a product, and changes in packaging and marketing. Any of these, if they increase the wholesale price of a fish product, are deemed to be added-value processing activities. BC Fisheries estimates that 59% of the wholesale value of BC fish products (excluding farmed salmon) in 1999 could be attributed to added-value processing.

Added-value processing is accounting for a growing share of total wholesale value

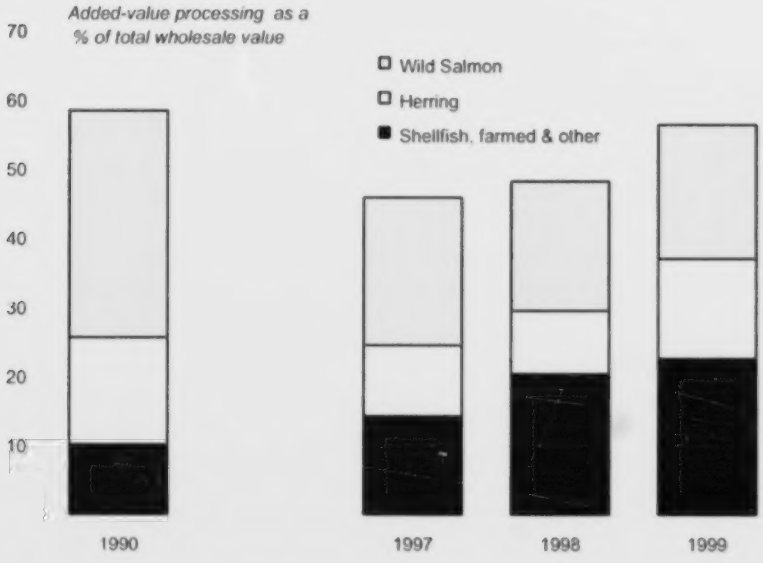

Figure 45

Generally speaking, the extent to which added-value processing occurs has been increasing since the mid-1990s. In 1999, 56% of the total wholesale value of fish and seafood products was the result of these processes. Shellfish (including farmed and other products) accounted for the biggest share (23%), followed by wild salmon (19%) and herring (14%).

13. Fish and Seafood Exports

The BC fish product and seafood industry exports much of its production, which is sold into an international market that is subject to considerable fluctuations in supply, demand and price.

Value of BC fish exports

Despite the decline in commercial landings for wild salmon during the 1990s, BC fish export values increased marginally over the decade, rising 10% in current dollar terms over nine years. In 1990, the export value of BC fish and seafood products totalled $773 million. That figure increased by $80 million to $853 million at the end of the decade.

In quantity terms, however, BC fish exports declined by 12% over the decade, from 145 thousand to 128 thousand tonnes. This means that a higher-priced product mix was being shipped internationally during the latter part of the decade. In particular, the average price paid for BC fish exports increased from $5.34 per kg to $6.67 per kg during the 1990s, a 25% rise over nine years.

Export values for BC seafood and fish products increased during the 1990s

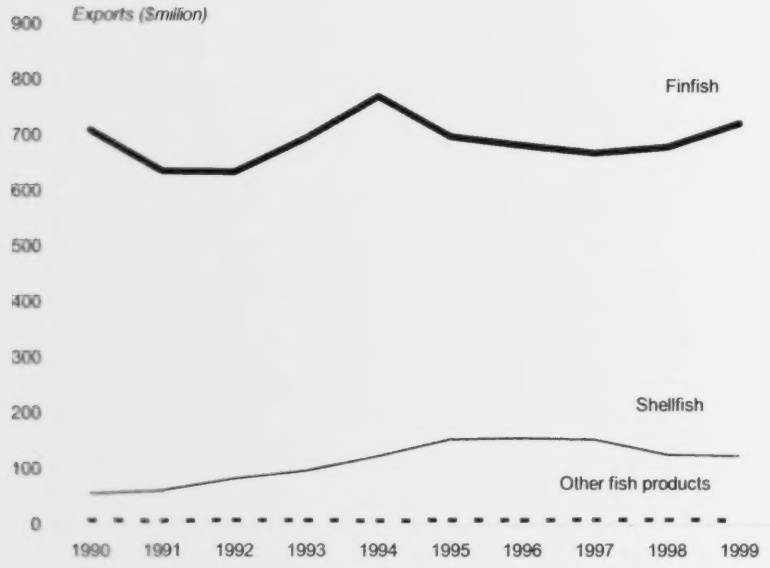

Figure 46

Value of BC finfish exports

In 1990, BC exports of finfish were $710 million and represented 92% of the total value of fish and seafood exports. At the end of the decade, finfish exports were valued at $722 million, or 85% of the total.

Exports of BC finfish maintained their value over the decade largely through the replacement of commercially landed wild salmon exports with international shipments of farmed product. In 1990, exports of BC wild salmon products were valued at $455 million. At the end of the decade, export sales had fallen to $104 million, a 77% reduction. Over the same period, exports of farmed BC salmon grew to 20 times the 1990 export value, from $13 million in 1990 to $256 million by the end of the decade. In 1990, farmed salmon represented just 3% of BC salmon exports (including salmon roe). By the end of the decade, the farmed salmon share of salmon exports stood at 71%.

Exports of BC wild salmon products dropped while exports of farmed product increased dramatically during the 1990s

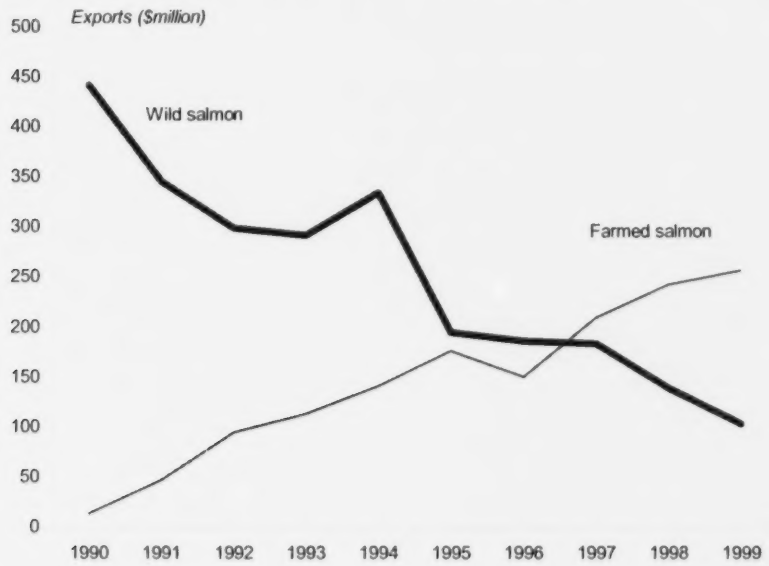

Figure 47

Other factors sustaining BC finfish export values during the 1990s included increased sales value for groundfish species, which were up 75% during the decade to $91 million. There was also a considerable growth in export value for halibut, which increased from just $14 million in 1990 to $78 million nine years later. Price rises for certain products (especially halibut) were important, as was an increased industry emphasis on improving the quality and refinement of seafood products sold into international markets. This effort included the development of new products and handling procedures for BC seafood, along with a focus on increasing the amount of added-value processing.

Other developments helping to maintain the level of BC finfish export values during the 1990s were re-exports later in the decade of significant quantities of US-caught halibut and herring, and the processing of US and Russian salmon as canned product.

Herring export value, predominantly roe herring, fluctuated considerably during the 1990s in response to changes in demand, world supply and associated price levels. Of particular importance was the softening of demand for this product due to weak economic conditions in Japan.

Value of BC shellfish exports

Shellfish represents a small share of BC fish exports. However, during the 1990s, BC shellfish producers doubled their share of provincial fish exports from 7% of total value in 1990 to 14% at the end of the decade. In 1999, shellfish exports were valued at $124 million, more than twice the $55 million value recorded in 1990. Export sales of shellfish peaked mid-decade at $154 million, but declined somewhat thereafter.

Geoduck clams have been the star in BC shellfish exports during the 1990s

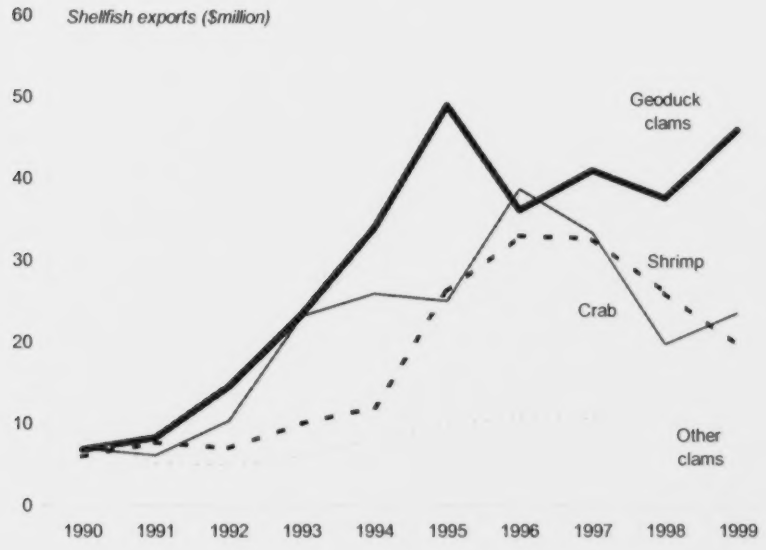

Figure 48

Major contributors to this growth in export value for shellfish products were geoduck clams, crab, shrimp and other clams. Export values for geoduck clams, crab and shrimp were quite low at the beginning of the decade, with sales below $10 million for each of these species. However, these products saw considerable export value growth to the mid-decade. After that, exports slipped notably for shrimp and crab. Export values for geoduck clams also declined in 1996, after a sharp rise in the previous year, but have since rebounded. For other clams, including both farmed and wild product, the value of BC export sales increased steadily during the 1990s after an initial decline early in the decade.

Oysters, a farmed product, also registered export sales growth during the decade, albeit at comparatively low values. BC oyster exports were $1.7 million in 1990, rising to about $4.5 million annually for most years since 1995.

Sea urchins, particularly sea urchin roe, is another BC shellfish product that had considerable export sales during the decade. While the BC fishery for this product began in the late 1970's, sea urchin export values and quantities were not identified separately in Canadian trade statistics prior to 1994. That year, the export value stood at $26 million (primarily sales to Japan). By the end of the decade, sea urchin exports had fallen to just $8 million, due in part to the introduction of quotas and other restrictions on the fishery.

Regional markets for fish and seafood exports

Regional markets for BC fish and seafood exports shifted quite dramatically during the 1990s. At the beginning of the decade, Japan was BC's most important export market for fish products, with exports of $347 million dollars to that country accounted for 45% of the total. Sales to the United States were $208 million, for a 27% market share. The European Union was the other large market for BC fish exports at the beginning of the decade, at $166 million or 21% of BC fish exports.

BC fish exports to the US grew while sales to Japan and the European Union declined

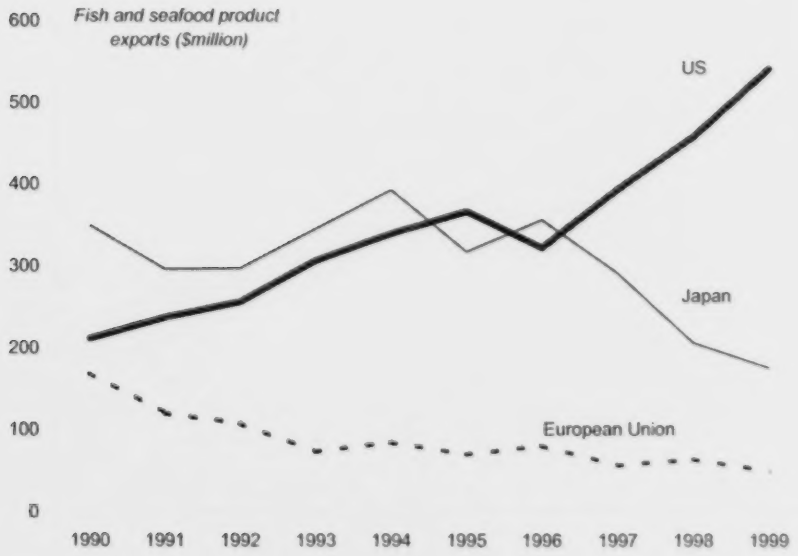

Figure 49

However, by the end of the decade the US had replaced Japan as BC's largest international customer for fish products. In 1999, export sales to the US reached $538 million, an increase of 158% in nine years. Sixty-three percent of BC's fish exports were destined for the United States in 1999. Over the same period, BC

fish sales to Japan fell by 50% to just $173 million. Japan's share of the market fell to 20%. The European Union also became a considerably less important market for BC fish and seafood products by the end of the decade, with sales declining 71% as BC product (mainly canned and, to a lesser extent, frozen salmon) was replaced by purchases from other suppliers. By contrast, there was a considerable increase in export sales to China.

As finfish dominates BC fish production and exports, trends over the decade in the regional pattern for BC finfish exports closely resemble those noted for total fish products. Quite a different pattern in regional export sales was observed for BC shellfish.

At the beginning of the decade, sales to the US and Japan dominated BC shellfish exports. In 1990, the value of BC shellfish exports to Japan and the US was virtually the same, at $21 million each. Together, the two countries accounted for 75% of the value of BC shellfish exports. China, the other important market for BC shellfish exports in 1990, had sales valued at $9 million and accounted for 16% of shellfish exports.

By the end of the 1990s, China had become BC's largest export market for shellfish products

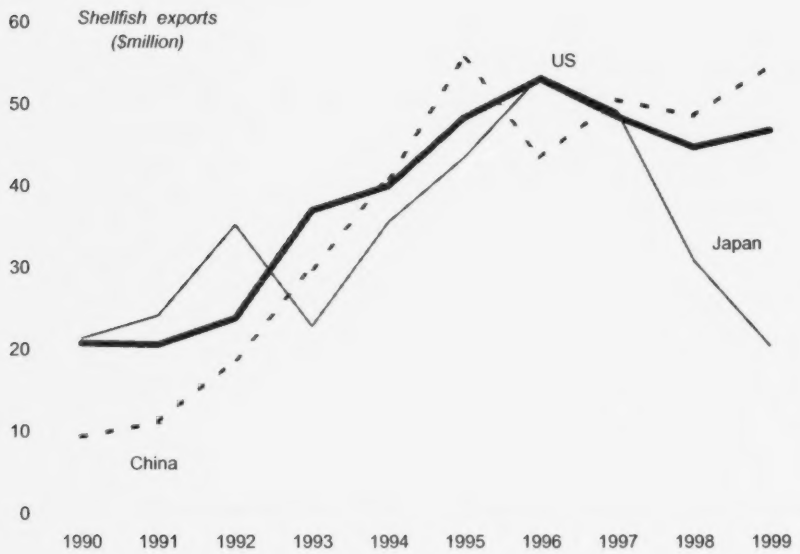

Figure 50

By 1999, China was the most important market for BC shellfish exports, reflecting the growing importance of geoduck clam sales to that market. Exports to China increased six-fold over the decade to reach $55 million and account for 44% of export sales. Sales to Japan generally rose through 1997, and then dropped sharply with the economic downturn in that country. In 1999, BC shellfish exports to Japan were $20 million, 5% lower than 1990 levels, and represented just 16% of the BC shellfish export market. Shellfish exports to the

US (primarily crab) increased by 127% over the decade to $47 million in 1999, giving the US a 38% market share.

14. Employment

Labour Force Survey estimates from Statistics Canada show that BC overall employment increased by 23% during the 1990s. However, the BC fish product and seafood industry did not share in this job growth. Rather, employment numbers for the sector fell by 21%, from an annual average of 11 thousand workers at the beginning of the decade to 8 thousand ten years later. In 1990, the industry accounted for 0.7% of BC total employment. Nine years later this share had fallen to 0.4%.

Annual employment figures are not actual counts of all the people who have worked in an industry in any given year. Instead, they represent the average number of people who worked in the industry over the course of the year. In industries such as fishing, which are highly seasonal in nature, there is considerable variability in the number of people employed from month to month. Figure 51 illustrates this point, using Statistics Canada employment estimates for the commercial fishery in 1999. Although the average annual employment in the commercial fishery for that year was about 4 thousand, the actual number of people working in the industry peaked at about 7 thousand in August, and dipped to less than 3 thousand during the winter months.

Seasonal fluctuations in the commercial fishery are large

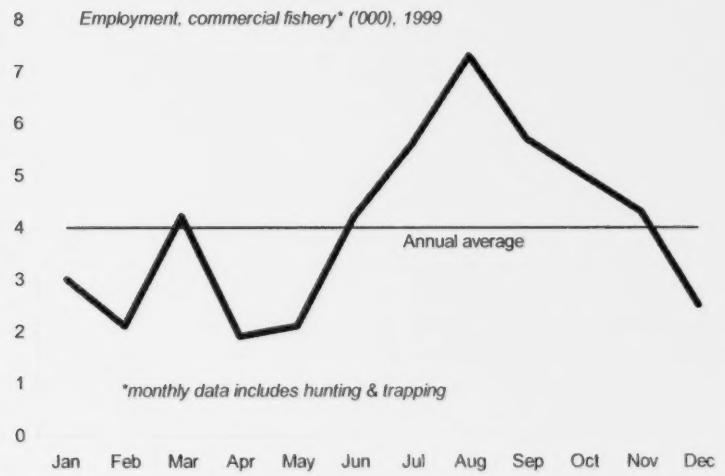

Figure 51

Commercial fishery employment

For the commercial fishery, annual average employment over the decade fell by 44%, from 6.4 thousand to 3.6 thousand, with just a brief resurgence in 1996 and 1997. Further, this employment was seasonal in nature. During the same period, the count of DFO fisher registration cards declined by 47%, from just over 20 thousand at the beginning of the decade to just under nine thousand in 1999. These decreases mirror the 29% reduction in BC commercial fish landings

over the decade (from 298 thousand tonnes to 210 thousand tonnes), as well as structural changes in the industry, including reductions in the BC fishing fleet.

Employment declined in the BC commercial fishery and for fish products manufacturing while remaining steady in aquaculture

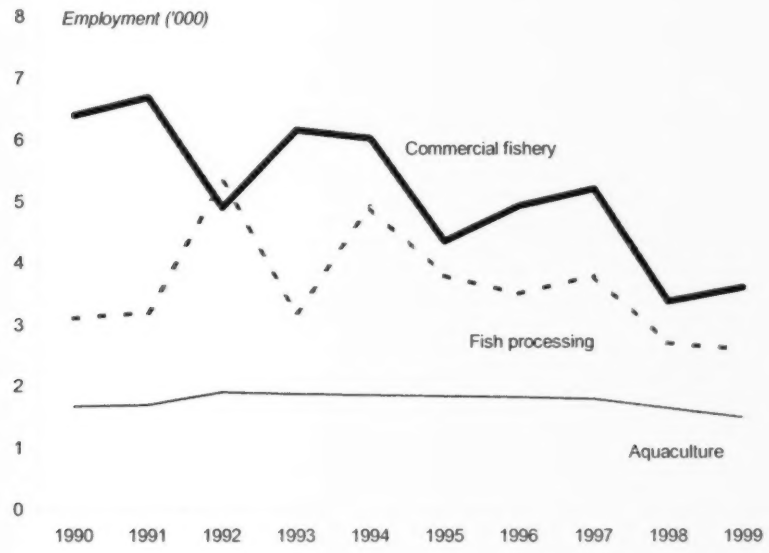

Figure 52

Aquaculture employment

Employment levels in BC aquaculture were generally steady over the decade. While the volume of aquaculture production increased 177% during the decade, employment for this industry did not grow, due to a greatly increased share for salmon farming which uses considerably less labour than shellfish aquaculture. In 1990, BC farmed salmon output was 3.3 times farmed shellfish production by weight. At the end of the decade, this ratio was 7.2 times.

Fish processing employment

Employment in fish product manufacturing was quite volatile during the early part of the 1990s, with annual average employment estimates ranging between 3 thousand and 5 thousand. For the remainder of the decade, the number of jobs generally declined. In addition, there was a marked regional aspect to changing levels in BC fish processing employment.

Although fish processing employment levels declined provincially after 1994, BC Fisheries reports a 35% increase during the decade for jobs located at Vancouver Island fish plants, and an increase in its share of BC fish processing employment from 14% to 30%. The Lower Mainland experienced a 35% reduction in fish processing employment, but maintained an average 61% share

of BC fish plant jobs over the decade. Major reductions in fish processing employment were seen for the Sunshine Coast (down 90%) and for the North Coast, Queen Charlotte Islands, Central Coast, and Interior (down 77%).

Vancouver Island's share of fish processing jobs increased during the 1990s

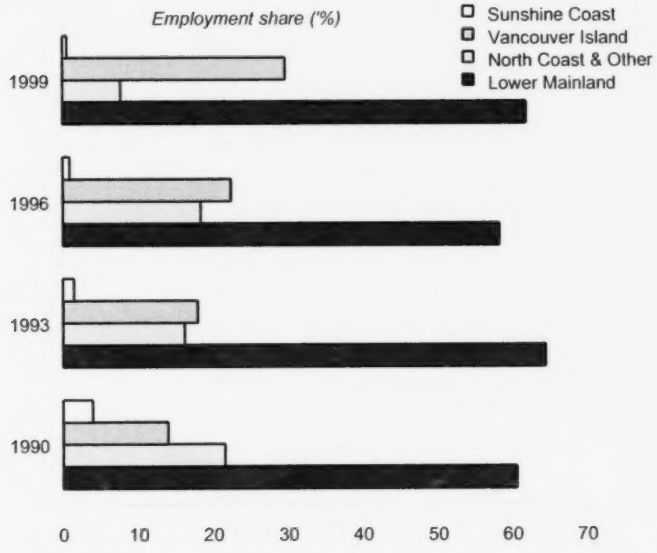

Figure 53